ANNEXURE TO INDENT NO: SHAR/VALF/2023000910

REQUEST FOR PROPOSAL (RFP)

FOR

PROCUREMENT, MANUFACTURE, SUPPLY, TRANSPORTATION, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH STRUCTURE (MLS) FOR SLC PROJECT

SPECIFICATIONS & PRICE SCHEDULE

OWNER	:	INDIAN SPACE RESEARCH ORGANISATION
PROJECT	:	SSLV LAUNCH COMPLEX
DELIVERY LOCATION	:	MADHAVANKURICHI, THIRUCHENDUR TK., THOOTHUKUDI DIST TAMIL NADU
CORRESPONDENCE CENTRE	:	SDSC, SHAR, SRIHARIKOTA

SSLV LAUNCH COMPLEX (SLC)

SATISH DHAWAN SPACE CENTRE

SRIHARIKOTA -524124

INDIAN SPACE RESEARCH ORGANISATION

REQUEST FOR PROPOSAL FOR MOBILE LAUNCH STRUCTURE SPECIFICATIONS & ANNEXURES			
SECTION	**SPECIFICATION NO: SLC-MLS-001/2023**	**ISSUE NO.**	**TITLE: REQUEST FOR PROPOSAL FOR MOBILE LAUNCH STRUCTURE**
SPECIFICATIONS			
A	SLC/MLS/SPEC	R0	GENERAL SPECIFICATION
B	SLC/ MLS /SPEC	R0	TECHNICAL SPECIFICATION
C	SLC/MLS/SPEC	R0	WELDING SPECIFICATION
D	SLC/ MLS /SPEC	R0	PAINTING SPECIFICATION
E1	SLC/ MLS /SPEC	R0	QUALITY ASSURANCE PLAN
E2	SLC/ MLS /SPEC	R0	BILL OF QUANTITIES
E3	SLC/MLS/SPEC	R0	DRAWINGS
ANNEXURES			
F1	SLC/ MLS /SPEC	R0	SCHEDULE OF PRICES
F2	SLC/ MLS /SPEC	R0	PREQUALIFICATION CRITERIA
F3	SLC/ MLS /SPEC	R0	SCHEDULE OF GENERAL PARTICULARS / VENDOR EVALUATION FORMAT
F4	SLC/ MLS /SPEC	R0	CONFIRMATION OF ACHIEVING ACCURACY
F5	SLC/ MLS /SPEC	R0	SCHEDULE OF DEVIATIONS FROM SPECIFICATIONS
F6	SLC/ MLS /SPEC	R0	SCHEDULE OF TIME FOR MANUFACTURE, DESPATCH AND SHIPMENT TO SITE
F7	SLC/ MLS /SPEC	R0	SCHEDULE OF BIDDERS EXPERIENCE & DETAILS OF PRESENT WORKS BEING EXECUTED.
F8	SLC/ MLS /SPEC	R0	DATA TO BE FILLED ALONG WITH BID FOR SUPPLY & COMMISSIONING OF MLS
F9	SLC/ MLS /SPEC	R0	CHECK LIST
F10	SLC/ MLS /SPEC	R0	SCHEDULE OF APPROVED MAKES

SECTION –A

GENERAL TERMS AND CONDITIONS OF THE CONTRACT

PROPOSAL DOCUMENT, CLARIFICATION AND ADDENDUM

Quotations are invited from the interested bidders for the enclosed scope of work in two-part bid. Part-1 technical & unpriced part of the work and Part-2 Priced commercial part.

Only experienced Bidders who are qualifying in pre-qualification criteria given in Section F2 only should quote.

The RFP document is organized in eight sections as follows.

Section –A General Specification, Terms and Conditions of the Contract

Section –B Scope of Work & Technical Specifications

Section –C Welding specifications

Section –D Painting specifications

Section- E1 Quality assurance plan

Section –E2 Bill of Quantities

Section –E3 Drawings

Section-F Annexures.

Title of the proposal: ***"PROCUREMENT, MANUFACTURE, SUPPLY, TRANSPORTATION, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH STRUCTURE FOR SLC PROJECT".***

Date Public Notification issued by ISRO: as per the notification

Last Date of downloading tender Document by tenderer: as per the notification

Date of Pre-Bid meeting: as per the notification

Last date of submission of tender documents in online by tenderer: as per the notification

Last date of Bid sealing in online by ISRO: as per the notification

Last date for giving open authorization in online by tenderer: as per the notification

A. PROPOSAL DOCUMENT

1. Bidder shall sign & stamp each page of the tender document (RFP) as token of his acceptance and submit the same.
2. Proposal documents shall remain the property of SDSC SHAR and shall not be used for any another purpose without the consent of SDSC SHAR.
3. The proposal shall be completely filled in all respects and Bid shall be tendered together with requisite information & Annexure. Any offer incomplete in any particulars is liable to be rejected.

4. The Proposal (Unpriced Techno-commercial bid) with a complete set of the required documents shall be up-loaded in ISRO e-procurement website.
5. The Proposals shall be submitted on-line in ISRO e-procurement portal before the time limit for bid submission specified in the Letter Inviting Bid.
6. Supplier shall submit the open authorization on line within the time limit specified in the Letter Inviting Bid.
7. The Proposal will be opened on the date and on the time specified in the Letter Inviting Bid or as soon thereafter as convenient. Proposal not received in time will not be considered.
8. Bidders shall set their quotations in firm figures and without variations/additions in the terms of the Proposal documents. In case of ambiguity between the numbers and letters, letters only will be considered for bid evaluation.

9. AMBIGUITY

Should there be any ambiguity or doubt as to the meaning of any of the tender clause/condition or if any further information is required, the matter shall be immediately brought to the notice of Head, Purchase & Stores of SDSC SHAR in writing.

B. PREPARATION OF BIDS

1. SITE VISIT

Bidder is advised to visit & examine the site at Madhavankurichi., Tamil Nadu (Full Address: SLC Project Office, Madhavankurichi Village – 628206, opp. to Koodal Nagar, Thiruchendur Tk., Thoothukudi Dist) and its surrounding to familiarize himself of the existing facilities & environment and shall collect all other information which may be required for preparing & submitting the Bid and entering into the contract. Claims and objections due to ignorance of existing conditions or inadequacy of information will not be considered after submission of the Bid and during implementation.

2. VALIDITY OF OFFER

Bid shall remain valid for acceptance for a minimum period **of 4 (four) months** from the due date of submission of the Bid. The Bidder shall not be entitled during the said period to revoke or revise his Bid or to vary the Bid except and to the extent required by SDSC SHAR in writing. Bid shall be revalidated for extended period as required by SDSC SHAR in writing. In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms & conditions of Bid finalized till that time.

3. COST OF BIDDING

All direct and indirect costs associated with the preparation and submission of bid shall be to Bidder's account and SDSC SHAR will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bid process.

4. APPLICABLE LANGUAGE/ MEASUREMENTS

The bid and all correspondence incidental to and concerning the bid shall be in the English Language. For supporting document and printing literature submitted in any other language, an accurate English Translation shall also be submitted. Responsibility for correctness in translation shall lie with the Bidder. All the measurements shall be given in metric system.

5. ARRANGEMENT OF BID

The Bid shall be neatly presented on white paper with consecutively numbered pages. It should not contain any terms and conditions which are not applicable to the Bid. The Bid and all details submitted by the Bidder shall be signed and stamped on each page as token of acceptance, by a person legally authorized to enter into agreement on behalf of the Bidder. (Corrections / alteration, if any, shall also be signed by the same person).

6. SCHEDULE OF PRICES

The schedule of prices shall be read in conjunction with all the sections of proposal document. The price must be filled online in the same format of ‘Schedule of Prices’ in Section F1. Hard copy of Price bid shall not be sent strictly. If hard copy of price bid is received the bid will be summarily rejected.

Price bid shall be filled in Price Bid form in e-procurement only. Price Bid annexures to be submitted in Price Bid supporting documents only and in e-procurement only.

Price bid filled with prices shall not be enclosed along with Technical & Unpriced Commercial Bid in e-procurement/ hard copy.

7. DOCUMENTS COMPRISING THE BID

Bids shall be arranged in the following order.

A. Part – I: Technical and Unpriced Commercial Part

Technical and unpriced commercial part shall comprise the attachments,

Specifying attachment number arranged in the order as follows:

(a) Submission of bid letter.

(b) Power of attorney in favour of authorized signatory of the bid / proposal documents.

(c) All the Section-A, B, C, D, E1 and E2 with all the annexure in Section-F1 to F10 enclosed in proposal duly filled, signed and stamped.

(d) Bid qualification criteria for supply of MOBILE LAUNCH STRUCTURE and all supporting documents.

(e) Write-up on the detailed procedure to be followed for erection and handling equipment including mobile cranes proposed to be used for erection of mobile launch STRUCTURE. All the material handling equipment are in the scope of contractor.

(f) Fabrication shop layout where fabrication of MLS is planned.

(g) Details of shop floor equipment like Furnace for stress relieving of plates, fabricated modules, welding equipment, edge preparation equipment.

(h) Details of machines for machining the surfaces of rings, plates etc.

(i**) Unpriced copy of** schedule of prices with all other commercial terms, taxes, duties, exemption certificates and conditions duly filled **(Prices to be kept blank**), signed and stamped.

(j) Audited balance sheet including profit and loss account for financial years 2020-21, 2021-22, 2022-23 showing annual turn over

(k) Copy of the Income Tax returns filed for financial years 2020-21, 2021-22, 2022-23

(l) Latest solvency certificate from a scheduled bank for a value not less than ₹150 Lakhs or above.

(m) Description of the procedures adapted for material procurement, fabrication with deviations from technical specification and proposed design modifications.

(n) Data sheets for all the equipment & checklists enclosed in proposal duly filled, signed & stamped.

(o) Technical literature & data sheets of equipment / machinery used by him and any other document as mentioned in the proposal.

(p) Project execution plan

(q) Bar chart for supply & erection schedule indicating the date of completion of various activities so as to complete the execution of the contract within the time frame stipulated in the tender specification.

(r) Any other relevant document, bidder desires to submit.

B. Part – II: Priced Commercial Bid

Priced commercial bid shall be filled on line in the price bid format in e-procurement. Schedule of prices/ Annexures also to be filled and uploaded in price bid supporting documents in e-procurement portal only.

No deviations, terms and conditions, assumptions, conditions, discounts etc. shall be stipulated in price bid. Department will not take cognizance of any such statement and may at their discretion reject such bids.

C. BID SUBMISSION

Bids duly filled in by the Bidder should invariably be submitted as stipulated in the Letter Inviting Bid. Bids shall be submitted in the following manner.

I. PART – I: UN PRICED TECHNO-COMMERCIAL PART OF THE BID FOR THE WORK

Complete Techno–commercial part of the bid shall be filled online in the "vendor Specified Terms' form of the e-tender. Any documents related (demand draft for tender fee & EMD), technical literature, guarantee / warrantee certificates and any other relevant documents as per the tender shall be scanned in lower resolution format and uploaded to the e-tender under 'Documents solicited from Vendor' form only in ISRO e-procurement portal (**https://eprocure.isro.gov.in**). In case if the space for uploading is not sufficient, hard copy of the balance documents shall be submitted before due date.

Envelope of technical bid shall be marked with following:

PART-I TECHNO-COMMERCIAL BID	
Name of client :	**Satish Dhawan Space Centre SHAR** Indian Space Research Organisation
Title of the proposal :	***"PROCUREMENT, MANUFACTURE, SUPPLY, TRANSPORTATION, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH STRUCTURE FOR SLC PROJECT"***
Tender Ref no:	
Due date and time of the opening :	DD/MM/YYY
From (Name of the bidder with address) :	
To: **Head, Purchase & Stores** **Satish Dhawan Space Centre** **SHAR** **ISRO, Dept. of Space** **Govt. of India** **Sriharikota – 524124,** **SPSR Nellore Dist,** **Andhra Pradesh, India**	

The deviation statement if any, and checklist shall be filled online, without which the bid will not be considered.

II. PART – II : PRICE PART OF THE BID FOR THE WORK

Price bid shall be filled in the on-line 'price bid' form of the e-tender only in ISRO eProcurement website https://eprocure.isro.gov.in. The cost of spares and other prices shall be filled in the respective forms available on-line in the eportal. Any other terms and conditions given in this part shall not be considered and if insisted upon by the Bidder, bids are liable for rejection.

a. SDSC SHAR may open Part – I of the bid on the due date of opening subject to meeting the minimum evaluation criteria. Price Bids (Part-II) of technically and commercially acceptable offers shall be opened at a later date.

b. SDSC SHAR reserves the right to reject any or all the Bids without assigning any reasons thereof.

c. **Any bids/offers with price details in Techno-Commercial Offer (Part –I) shall be rejected.**

D. Vendor Evaluation Format

SDSC SHAR seeks response to the given questionnaire for assimilating data which would be used for evaluating the capability of the supplier for executing the referred work. Hence, the supplier is requested to provide only genuine data and any discrepancy found at a later point of time may result in rejection of the supplier from purchase process. Furnishing of data cannot be construed as automatic qualification for participation in the tender. Questionnaire should be signed by a responsible and authorized person of the Company / Agency.

Schedule of general particulars / vendor evaluation format shall be filled as per **Section: F3.** Schedule of Bidders experience and details of present works being executed are to be filled as per **Section: F7**.

Note: In order to consider as valid experience, all the experience has to be supported with the technical details, completion certificate and purchase order.

E. DETERMINATION OF RESPONSIVENESS

SDSC SHAR will scrutinize tenders to determine whether the tender is substantially responsive to the requirements of the tender documents. For the purpose of this clause, a substantially responsive tender is one which inter-alia conforms to all the terms and conditions of the entire Tender document without any deviations and reservations. The decision of SDSC SHAR shall be final in this regard.

F. BID EVALUATION

I. During evaluation, SDSC SHAR may request Bidder for any clarification on the bid OR additional documents.

II. Techno-commercial discussion (pre-bid meeting) shall be arranged with Bidder in off-line or on-line mode. Bidder shall depute his authorised representatives for attending discussions. The representatives attending the discussions shall produce authorisation from his organisation to attend the discussion and sign minutes of meeting on behalf of his organisation. The authorised representative must be competent and empowered to settle/decide on all technical and commercial issues. The bid is liable for rejection if the party submits the bid without attending pre-bid meeting.

III. Bidder must provide the point by point compliance to the technical specifications along with deviations as per “Schedule of deviations” attached in section F5. The tender will be rejected, if the deviations are not acceptable to the Department. If no deviation is indicated by the bidder, it shall be deemed that all the terms and conditions as per tender document are acceptable to the bidder.

IV. Performance of Bidder in similar nature of works executed/ under execution shall be taken into consideration before selecting the Bidder for opening his price bid.

V. The time schedule for completion is given in the Proposal document. Bidder is required to confirm the completion period unconditionally.

VI. If necessary, to arrive at evaluated prices, wherever applicable, loading on total quoted prices shall be done.

VII. SDSC SHAR reserves the right to accept a bid other than a lowest and to accept or reject any bid in full or part without assigning any reasons. Such decisions by SDSC SHAR shall bear no liability whatsoever consequent upon such decision.

VIII. SDSC SHAR reserves the right to alter the quantities specified based on prices quoted for part work or unit rate quoted by BIDDER.

IX. The Bidder, whose bid is accepted by SDSC SHAR, shall be issued a Letter of Intent (LOI) /Purchase Order (PO) to proceed with the work. Successful Bidder shall confirm acceptance by returning a signed copy of the LOI/PO.

GENERAL SPECIFICATIONS

1. INTRODUCTION

SDSC SHAR invites online tenders from reputed firms with proven ability to ***"PROCUREMENT, MANUFACTURE, SUPPLY, TRANSPORTATION, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH STRUCTURE (MLS) FOR SLC PROJECT"*** as per the specifications

2. SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

The detailed scope of work and technical specifications are given in Sections B, C D, E1, E2 & E3 of RFP document. The general terms and conditions are given below.

3. SUPPLIER's OBLIGATIONS & FUNCTIONS

3.1. SPECIFICATIONS AND DRAWINGS

The Supplier shall execute the works in compliance with the provisions of CONTRACT, good engineering practices and codes requirements.

3.2. SUBMISSION OF TECHNICAL DOCUMENTS

Supplier shall prepare and submit to SDSC SHAR for approval of following documents and drawings:

3.2.1. Technical literatures & data sheets of equipment used by him.

3.2.2. Fabrication shop layout for fabricating of MLS.

3.2.3. Details of heat treatment / stress relieving equipment

3.2.4. Details of Turning machines / milling machines to be used for machining.

3.2.5. Assembly Shop layout drawings suitable for control assembly of MLS.

3.2.6. Erection sequence schedule along with erection drawings.

3.2.7. Detailed Quality Assurance Plan

3.2.8. No activity shall be executed unless SDSC SHAR's approval is obtained. The above documents shall be submitted in a format approved by SDSC SHAR.

3.3. PROCUREMENT, FABRICATION & SUPPLY

Procurement of raw materials shall be from preferred vendors/ makes listed in section F10 of RFP document

Supplier shall carry out detailed shop floor fabrication drawings based on department provided fabrication drawings and supply of the MOBILE LAUNCH STRUCTURE in accordance with the scope, technical specifications and terms & conditions of contract.

3.4. DELIVERY AND STORAGE

3.4.1. Dispatch Instructions given in the Contract shall be strictly followed. Failure to comply with the instructions may result in delay in payment apart from imposing any other charges as may be deemed to fit.

3.4.2. The Supplier shall be responsible for transporting all the material, equipment to site, unloading and storage.

3.4.3. No material shall be delivered without obtaining dispatch clearance from Department.

3.4.4. All the fabricated items shall be properly packed to avoid any damage during transportation / handling / storage and any damages found has to be replaced at free of cost by supplier.

3.4.5. The equipment and material received at site (Madhavankurichi) shall be stored at a place assigned for this purpose. Complete address of site is: SLC Project Office, Madhavankurichi Village – 628206, opp. to Koodal Nagar, Thiruchendur Tk., Thoothukudi Dist, Tamilnadu

3.4.6. Supplier shall take proper care while storing the equipment and shall provide watch & ward at his own cost.

4. INSTALLATION

4.1. GENERAL

4.1.1. Supplier’s staff shall include adequate number of competent erection engineers with proven experience on similar works to supervise the erection works and sufficient skilled, unskilled and semiskilled labour to ensure completion of work in time.

4.1.2. Supplier's erection staff shall arrive at site on date agreed by SDSC SHAR. Prior to proceeding to work, Supplier shall however, first ensure that required/sufficient part of his supply has arrived at site.

4.1.3. Erection of equipment may be phased in such a manner so as not to obstruct the work being done by other Suppliers and/ or operating staff who may be present at that time.

4.1.4. During erection, Department's quality team / their engineer will visit site from time to time with or without Supplier’s engineer to establish conformity of the work with specification. Any deviations, deficiencies or evidence of unsatisfactory workmanship shall be corrected as instructed by Department. All the material handling equipment shall be in the scope of vendor only.

4.1.5. Supplier shall carry out work in a true professional manner and strictly adhere to the approved drawings. Any damage caused by Supplier during erection to new or existing building / environment shall be made good at no extra cost to Department.

4.2. RECORDS

Supplier shall maintain records pertaining to the quality of erection work in a format approved by Department. Whenever erection work is complete, Supplier shall offer erected equipment for inspection to Department's engineer who along with Supplier's engineer will sign such records on acceptance.

4.3. MLS ERECTION, TESTING & COMMISSIONING

4.3.1. Supplier shall carry out the works in accordance with the specific instructions given on the approved drawings, method statements, manufacturer's drawings / documents or as directed by Department. MLS shall be erected in neat manner so that they are level, plumb, and square and properly aligned and oriented. Tolerances shall be as established in manufactures fabrication drawings or as stipulated by Department. No equipment shall be welded or bolted, until its alignment is checked and found acceptable by Department.

4.3.2. Supplier shall provide all supervision, labour, tools for erection, testing and inspection, machines, cranes, equipment, scaffolding, rigging material and incidental material such as bolts, wedges, anchors, etc. required to complete the works. Supplier shall also provide at his own cost all such consumables like oxygen – acetylene gas, welding rods, grinding wheels, temporary supports, shims etc. required to complete work.

4.3.3. Supplier shall take utmost care while handling instruments, delicate equipment, panels etc. and protect all such equipment on erection.

4.4. SAFETY

Supplier shall follow the safety regulations / codes and shall take necessary measures at his own cost.

4.5. ERECTION & CONSTRUCTION POWER

4.5.1. Electrical power may be extended by Department on chargeable basis, as per the tariff rules of State Electricity Board, Tamil Nadu. Reasonable quality of normal Construction power will be made available at one point which is more than 100m away from the work site (415V, 3 phase, 50 Hz). However onward distribution shall be by the supplier. Installation of necessary power cables of 100m or more, energy meters, switchgear, distribution system & necessary protection system etc. for Construction power in a safe manner in strict conformity with local rules & regulations will be responsibility of supplier.

4.5.2. During non-availability of power, supplier shall make his own arrangement of alternate power source at their cost.

4.6. SITE PREPARATION / CLEARANCE

4.6.1. No site preparation works are planned by Department for site fabrication works. Preparation of required site for fabrication and approach requirements for handling the

MLS shall be in scope of contractor. The site identified in such works shall be within near SLC building location.

4.6.2. Upon completion of work, supplier shall remove all his equipment and material from the site within one month or time mutually agreed. Supplier at all times shall keep site in clean condition and remove all unwanted material at regular intervals. In case supplier fails to remove all their equipment and material within the mutually agreed time, it is deemed that Department will arrange to remove the same at Supplier's cost.

5. ACCOMMODATION

Supplier shall make their own arrangement for accommodation, transportation & canteen facility for all his staff, technicians, labour & workers.

6. MEDICAL FACILITIES

No medical facilities will be provided by SDSC SHAR. Supplier shall make their own arrangement at their own expenses for medical facilities for site personnel.

7. WORK PROGRAMME

Supplier shall prepare a detailed programme schedule for review / approval by SDSC SHAR. Supplier as per exigencies of work shall revise and update programme periodically.

7.1. SUB-CONTRACTS

7.1.1. No work shall be sub-contracted without prior approval of SDSC SHAR.

7.1.2. Supplier shall be responsible for the proper execution of any sub-contract placed by him in connection with this purchase order.

7.1.3. Supplier shall furnish to SDSC SHAR the copies of all un-priced sub-orders showing promised delivery dates and places.

8. CHANGES AND MODIFICATION TO SPECIFICATIONS, DRAWINGS AND QUALITATIVE / QUANTITATIVE REQUIREMENTS

8.1.1. Supplier shall obtain approval from SDSC SHAR before initiating the action for procurement of bought out items.

8.1.2. During the fabrication review, supplier has to carry out the mutually agreed modifications to meet the overall requirement.

9. RECORD OF DRAWINGS AND O&M MANUALS

9.1. Supplier shall submit 3 hard copies & one soft copy of all the approved drawings incorporating any modification / changes made during the execution of CONTRACT. All these drawings shall be marked as 'As Built'.

9.2. Submission of the drawings shall be a precondition for releasing of any final payment due to Supplier.

10. TAXES AND DUTIES

10.1. CGST/SGST/UTGST/IGST (whichever is applicable) shall not be included in the lump sum quote, but indicated (both percentage of tax applicable & amount on which it is applicable) separately in schedule of prices.

10.2. It is the responsibility of the contractor to issue the Tax Invoice strictly as per the format prescribed under the relevant applicable GST law (CGST Act/SGST Act/UTGST Act/IGST Act). Contractor to indicate the proper GSTN Registration/ HSN/SAC code in their tax invoices.

10.3. CGST/SGST/UTGST/IGST shall be paid at actuals against Tax Invoice.

10.4. GST details of SDSC SHAR are given below

GSTIN: 37AAAGS1366J1Z1or TAN BASED 37HYDF00385A1D2

LEGAL NAME: SATISH DHAWAN SPACE CENTRE SHAR

11. STATUTORY VARIATION

Statutory variation for CGST/SGST/UGST/IGST is applicable, provided the actual completion of services does not occur beyond the period stipulated in the order/contract or any extension (without levy of penalty). For variation after the agreed completion periods, the service provider alone shall bear the impact for the upwards revisions.

For downward revisions, the Department shall be given the benefit of reduction in CGST/SGST/UGST/IGST.

12. RISK COVERAGE

The Supplier shall arrange comprehensive risk coverage at his own cost covering the value of item including transportation to the site from manufacturer’s works, storage at site, erection, testing and commissioning at site. The period of such coverage shall be up to contractual completion period or any extension granted by Department thereof.

13. INCOME TAX

Income tax at the prevailing rate as applicable from time to time shall be deducted from the supplier's bills as per Income Tax Act, 1961 and the rules there-under or any re-enactment or modifications thereof and a TDS certificate shall be issued.

14. SECURITY DEPOSIT (SD)

14.1. The supplier, whose tender is accepted, will be required to furnish by way of security deposit for the due fulfilment of the contract such a sum as will amount to 3 % of the contract price of the work awarded.

14.2. The security deposit (bearing no interest) shall be held by the Department as security till satisfactory completion, testing and handing over of all the system and for the due performance of all suppliers' obligations under the contract as per delivery period or extension granted thereof by the Department.

14.3. The supplier within 10 days of Purchase Order or signing of Contract, deposit with the Accounts officer, Satish Dhawan Space Centre SHAR, Sriharikota as detailed above by any one or more of the following modes namely

I. By a crossed demand draft in favour of Accounts officer, Satish Dhawan Space Centre SHAR drawn on SBI and payable at Sriharikota.

II. By a bank guarantee in the prescribed format (required format will be provided after award of contract). The bank guarantee shall be from a nationalized bank & shall be valid for 60 days beyond completion period.

14.4. In case of breach of contract, the Performance Security (SD) shall stand forfeited in addition to other relief available to the Department under this contract.

15. PACKING AND FORWARDING

15.1. The Supplier shall arrange to have all the material suitably packed as per the standards and as specified in the contract. Unless otherwise provided for in the contract, all containers (including packing cases, boxes, tins, drums, and wrappings) used by the Supplier shall be non-returnable.

15.2. All packing and transport charges, transit handling costs, transit risk coverage and transport fees of agents employed at the place of delivery or elsewhere, shall be deemed included in the price to be paid to the Supplier.

16. ARBITRATION

The Work Order shall be interpreted, construed and governed by the Laws in India. In the event of any dispute(s) and/or difference(s) arising out of or relating to the interpretation and application of the Work Order, such dispute(s) and/or difference(s) shall be settled amicably by mutual consultations of the good Office of the respective Parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties. If such a resolution is not possible within 30 days from the date of receipt of written notice of the existence of such dispute(s) and/or difference(s), the unsolved dispute(s) and/or difference(s) shall be referred to the Arbitrators appointed by the

Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Amendment Act, 2015 as amended from time to time. The arbitration shall be conducted in Bengaluru in the Arbitration and Conciliation Centre-Bengaluru (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the Parties. The applicable language for Arbitration shall be “English” only.

Services under the Work Order shall be continued by Party during the pendency of arbitration proceedings, without prejudice to a final adjustment in accordance with the decision of the Arbitrator unless otherwise directed in writing by the Centre (SDSC SHAR) or unless the matter is such the Work Order cannot be possible continued until the decision (whether final or interim) of the Arbitrator is obtained.

17. APPLICABLE LAW AND JURISDICTION

The laws of India shall govern this purchase order for the time being in force. The Courts of Andhra Pradesh, India only shall have jurisdiction to be with and decide any legal matters or disputes what so ever arising out of the purchase order.

18. FORCE MAJEURE

Should a part or whole work covered under this purchase order be delayed due to reasons of Force Majeure which shall include legal lockouts, strikes, riots, civil commotion, fire accident, quarantines, epidemic, natural calamities and embargoes the completion period for work, equipment referred to in this agreement shall be extended by a period not in excess of the duration of such Force Majeure. The occurrence shall be notified within reasonable time.

19. GUARANTEES

The Supplier shall guarantee that the items and equipment furnished by him is in conformance with the requirement of the specifications. Goods covered by the contract shall be free from defects in materials or workmanship for a period of **Twelve months** from the date of successful commissioning & acceptance by Department.

20. WARRANTY

The bidder shall provide ***12 months'*** warranty for the entire system for a defect liability, after final official handing over at his cost. During this period, supplier has to provide and adhere to the following:

20.1. He has to attend quarterly based preventive maintenance visits and breakdown maintenance calls. All the defective components have to be replaced or rectified on one to one basis.

20.2. Department will not provide any transport/accommodation.

20.3. In case vendor failed to attend and repair the system within 7 days from the date of reporting the problem, Department will reserve right to forfeiting the BG apart from withheld of any payment payable to the vendor.

20.4. Where defects in items are remedied under warranty, the period for which the warranty operates shall be extended by such period, as the items were not available to SDSC SHAR. Where defect items are replaced by new ones, the full warranty period stipulated in the purchase order shall apply to such replacement items as from the date of their delivery.

21. SCHEDULE OF PRICE

21.1. CONTRACT price shall include all costs of *"procurement, manufacture, supply, transportation, inspection, erection, testing and commissioning of mobile launch STRUCTURE for SLC project"*, shop testing, packing, forwarding, transport to site, unloading, storage, all risk coverage, erection, installation, testing & evaluation and commissioning of equipment including any other cost for proper and complete execution of the CONTRACT.

21.2. CONTRACT prices shall also include all travelling expenses, living expenses, salaries, overtime, benefit and any other compensation for engineers, supervisors, skilled, semiskilled workmen, watch and ward staff, labours and other staff employed by the Supplier, cost of tools and tackles required for erection and other consumable material required, materials, equipment and all taxes, duties, and levies as applicable on the date of submission of bid.

21.3. Erection charges including third party inspection charges shall be firm and fixed even for the **± 10%** quantity variations also.

21.4. Price shall be firm & fixed and the contractor has to agree for the same rates for the ± 10% quantity variations also.

21.5. Supplier shall agree for addition/ deletion of the works for the same quoted unit rates and such variation is limited to +/-10% of the ordered quantities.

21.6. The rate quoted shall be on FOR Madhavankurichi, Thoothukudi Dist Tamil Nadu basis.

21.7. The taxes applicable for supply and erection & commissioning shall be indicated separately in the price bid. If the offers submitted by the tenderers are silent on taxes, it will be presumed that quoted rates are inclusive of taxes & duties and no claim in this regard will be entertained later.

22. DISCOUNTS

Tenderer shall not indicate any discount separately and quoted price should be after deducting the discount.

23. MODE OF PAYMENT

All the payments will be made through PFMS within 30 days of receipt and acceptance of the ordered items at our site in good condition. Bidder shall furnish their Bank Account & IGST details in the Invoice for arranging payment.

24. TERMS OF PAYMENTS

General guideline TERMS OF PAYMENTS are as indicted below. Any deviation to these payment terms to be brought out.

A. In general, our payment terms will be 100% within 30 days after receipt, commissioning and acceptance.

B. However, if Vendors/Suppliers are requesting for advance payment, department may consider as given below,

1. After placement of confirmed Purchase Order:

   30% of supply cost as advance against submission of bank guarantee for an equal amount from a nationalized/scheduled bank and shall be valid till Contract completion period plus 60 days. Format of Bank guarantee shall be obtained from Department after award of contract.

2. After receipt of items and acceptance at SLC site:

   60% of supply cost of the Purchase order against receipt of materials at Purchasers / Department site on pro-rata basis as decided by department along with GST (including for advance portion).

3. After commissioning at Madhavankurichi, Tuticorin Dist, Tamil Nadu:

   Balance 10% of supply cost and 100% of commissioning charges after installation and acceptance by Department and submission of Performance bank guarantee of equal amount valid till warranty period plus 60 days.

   100% of third party inspection charges along with GST after Erection, Commissioning and acceptance of the system.

Advance Payment

Wherever advance payment is requested, Bank Guarantee from any Nationalized Bank/Scheduled Bank should be furnished. In case of advance payments, if the

vendor/supplier is not supplying the material within the delivery schedule, the advance amount will be recovered and interest will be levied as per the Marginal Cost of Lending Rate (MCLR) of SBI plus 2% penal interest.

Further wherever advance payments are requested, Interest will be loaded for advance payments/stage payments as per the MCLR of SBI and will be added to the landed cost for comparison purpose while arriving at L1. In case of different milestone payments submitted by the parties, a standard and transparent methodology like NPV will be adopted for evaluating the offers.

24.1. PERFORMANCE BANK GUARANTEE

24.1.1. The supplier shall guarantee for the performance of the finished structure by providing bank guarantee in favour of the Department for an amount equivalent to **3 %** (three percent) of the total value of this contract valid till the warranty period of the contract plus 3 months claim period.

24.1.2. The performance bank guarantee shall be submitted by the supplier with in fifteen days from the date of accepting the item as per the CONTRACT. Format for the performance bank guarantee shall be obtained from the Department.

25. DELIVERY SCHEDULE

The realization of fabrication works within the schedule is very essential. Hence, bidders are requested to adhere to the schedules given below. Contractor shall follow the following schedule for executing the contract:

S.No	Description of Target	Responsibility	Target Completion Date
1	Purchase Order release	Dept.	T
2	Procurement, fabrication / machining, control assembly, inspection, transportation, handling and storage at site.	Vendor	T + 10 months
3	Department clearance for erection and commissioning.	Dept.	T1
4	Erection, testing & Commissioning of the structure	Vendor	T1 + 2 months

26. LIQUIDATED DAMAGES

In the event of the Supplier failing to complete the total scope of work as per P.O within the delivery period specified in the contract agreement or in extension agreed thereto, Department shall reserve the right to recover from the Supplier as liquidated damages, a sum of 0.5 percentage per week or part thereof of the undelivered portion of the total contract price of

equipment or work. However, the total liquidated damages shall not exceed **10.0** percentage of the total Contract price. The LD reckoning date shall be **T+10 months** for supply portion and **T1+2 months** from the date of Department clearance for erection & commissioning portion of the contract price.

27. DISCLOSURE AND USE OF INFORMATION

27.1.1. If the documents supplied by SDSC SHAR are marked **"Strictly Confidential"**, supplier shall take all necessary steps to ensure the same.

27.1.2. Supplier shall guarantee that all information and data received during contract period is confidential and should not be revealed to any other.

27.1.3. Execution of Purchase Order from SDSC SHAR shall be classified as **"confidential"** within the meaning of the Official Secrets Act and will not be divulged to any third party without prior written permission of SDSC SHAR. All drawings & documents shall be returned after execution of work.

27.1.4. No publicity of any kind whatsoever regarding this work shall be given without prior clearance from SDSC-SHAR

28. ACCEPTANCE AND REJECTION:

On completion of the work or part of the work as specified in the contract, the representative of the Department referred to, shall check as soon as possible, but in any event within one month of notification of readiness for acceptance that the work performed complies with the contract requirements as regards quantity and quality.

In the event of rejection of any of the articles, whereby the Supplier feels himself aggrieved, he may within eight days of the receipt of notification of rejection and before such articles have been removed from the place of inspection, give the Department notice of objection. Such objection shall be considered by a Board of Appeals of the Department. The Department shall, without prejudice to the arbitration clause in the contract, take a decision upon presentation of the Board's findings.

On completion of tests, the members of the Inspection Organisation of the Department or Inspection agency appointed by Department shall prepare a report, which must be countersigned by the Supplier.

29. SUSPENSION:

29.1. Department may notify the Supplier to suspend performance of any or all of his obligations under the Contract. Such notice will specify the reasons for suspension and the effective date of suspension. Supplier there upon shall suspend the performance of

such obligations until ordered in writing to resume performance of Contract by Department.

30. CANCELLATION

30.1. GENERAL RULE

The Department shall have the right at any time to cancel a contract either holly or in part by giving written notice by registered mail. From the time of receipt of the written notice, the Supplier shall undertake to observe the instructions of the Department as to the winding up of the contract both on his own part and on the part of his sub-suppliers.

30.2. WITHOUT FAULT OF SUPPLIER

In the case of cancellation of a contract by the Department without any fault of the Supplier, the Supplier shall on receipt of Department's instructions forthwith take the necessary steps to implement them. The period to be allowed to implement them shall be fixed by the Department after conclusion with the Supplier and, in general, shall not exceed three months.

Subject to the Supplier confirming, Department shall take over from the Supplier at a fair and reasonable price all finished parts not yet delivered to the Department, all unused and undamaged material, bought-out components and articles in course of manufacture in the possession of the supplier and property obtained by or supplied to the Supplier for the performance of the contract, except such material, bought-out components and articles in course of manufacture as the supplier shall, with the agreement of the Department, elect to retain.

30.3. WITH FAULT OF SUPPLIER:

The Department reserves the right, after full consideration of all relevant circumstances, including the observations of the supplier, to cancel a contract in any of the following circumstances.

30.3.1. In the event of the Supplier's failure to meet

I. The Technical requirements of the Supplier.

II. The Progress and/or delivery requirements.

30.3.2. If the Supplier has not observed the provisions of the contract concerning the disclosure and use of information provided by the Department.

30.3.3. If the Supplier fails to comply with the provisions of the contract concerning the equipment, supplies and technical documents made available by the Department.

30.3.4. If the Supplier transfers his contract without the Department's authorization or concludes sub-contracts against the Department's explicit directives.

In the event that Supplier unjustifiably repudiates the Contract or fails to ship or dispatch all or part of the goods ordered for reasons other than those attributed to the Department's actions or as provided in the Force Majeure clause, the Department may, by giving an appropriate notice in writing to the Supplier, fix a Date of Essence by which the Supplier must complete the dispatch in full. If the Supplier fails to do so, the Department, in addition to his right to recover Liquidated Damages in terms of the Contract, shall also have the right to cancel this Contract and make substitute purchases from other sources. If the goods are in a partial state of fabrication, Department may have the fabrication completed by other means, in which event Supplier shall be liable to Department for the additional expenses incurred thereby, but shall not have any claim on savings, if any, in such cases.

In the event of such cancellation, the Department shall unless otherwise specified in the contract, only pays.

- In the case of a fixed-cost contract for the supply of equipment or material. The contractual value of items delivered and accepted under the contract before receipt of notification of cancellation, or to be accepted under the special conditions of cancellation.
- In the other cases.

A fair and reasonable price in respect of such work as has been carried out prior to the receipt by the Supplier of notification of cancellation.

31. FRAUDULENT PRACTICES, BRIBERY AND CORRUPTION OF GOVERNMENT SERVANTS

The contractor represents and undertakes that he has not given, offered or promised to give, directly or indirectly any amount, gift, consideration, reward, commission, fees, brokerage or inducement to any person in service of the department or otherwise in procuring the contracts or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the contract or any other contract with the Government for obtaining a contract or showing or forbearing to shoe favour or disfavour to any person in relation to the contract or any other contract with the government. Any breach of the aforesaid undertaking by the contract or any one employed by him or acting on his behalf or for his benefit (whether with or without the knowledge of the contractor) or the commissioning of any offence by contractor or any one employed by him or acting on his behalf, as defined in chapter IX of the Indian Penal code, 1860 or the prevention of corruption Act. 1947 or any other Act enacted for the prevention of corruption shall, without prejudice to any other legal action, entitle the Department to cancel the contract either wholly or in part, and all or any other contracts with Contractor and recover from the Contractor such amount or the monetary value thereof and the amount of any loss arising from such cancellation without any entitlement or compensation to the Contractor. The

Department will also have the right to recover any such amount from any contracts concluded earlier between the contractor and the Government of India. The contractor will also be liable to be debarred from entering into any contract with the Government of India for a minimum period of five years. A decision of the Department to the effect that a breach of the undertaking had been committed shall be final and binding on the Contractor.

PROJECT INFORMATION

1.0	Project Title	:	SSLV Launch Complex (SLC)
2.0	Location of Plant	:	Madhavankurichi, Thiruchendur Tk., Thoothukudi Dist Tamil Nadu
3.0	Elevation	:	22.00 m from MSL
4.0	Access to Site	:	Road From Tiruchendur apprx. 25 km From Udangudi approx 10 km Rail Tiruchendur 25 km
5.0	Terrain	:	Uneven with level varying significantly
6.0	Climatic Conditions		
a)	Temperature		
	Mean of daily max	:	32.8 °C
	Mean of daily min	:	22.6 °C
	Maximum Temperature	:	40.6 °C
	i. Design ambient temperature for performance guarantee	:	45.0 °C
	ii. For electrical system design	:	50 °C
b)	Relative humidity		
	i. Range	:	15% to 100%
	ii. Design relative humidity for performance guarantee	:	85%
c)	Rainfall		
	i. Annual average maximum	:	680 mm
7.0	Wind Load		
	Basic wind speed	:	39 m/s (Enhanced by a factor 1.3)
8.0	Seismic Data	:	As per IS : 1893 latest issue
	Zone	:	Zone III
9.0	Auxiliary Power Supply		
a)	Construction power	:	415 V $\pm$ 10%, 3 phase, 4 wire, 50 Hz $\pm$ 5%, AC supply at one place. Further distribution by Bidder
b)	All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without change in their performance :		
	AC supply	:	Voltage variation $\pm$ 10% Frequency variation $\pm$ 5% Combined voltage & Frequency variation: 10%

TECHNICAL SPECIFICATIONS FOR MLS

1.0 SCOPE

This specification covers the general requirements for procurement, supply of material, manufacture, testing, inspection at CONTRACTOR'S works, packing, forwarding, transportation, transit insurance, delivery at SLC site at Madhavankurichi, Thiruchendur tk., Thoothukudi dist Tamil Nadu, erection/installation, testing, commissioning at site and carrying out performance / acceptance tests of the equipment, materials and services as per enclosed data sheets and other documents.

2.0 BACKGROUND INFORMATION

The Mobile Launch Structure (MLS) is a fabricated steel structure for launching SSLV. It provides the platform for vehicle integration at Integration Building, transportation of launch vehicle from Integration Building to Launch pad using bogie on rail track and provides the platform for Launch vehicle during lift off.

The Launch vehicle is assembled on the MLS in the SSLV Assembly Facility and then the MLS is moved on bogie over rails to the launching site and then fixed to the ground through anchor legs.

3.0 EQUIPMENT AND SERVICES TO BE PROVIDED BY CONTRACTOR

3.1 SUPPLY OF ALL MATERIALS TO SITE INCLUDING BUT NOT LIMITED TO THE FOLLOWING ITEMS:

3.1.1 Structural Deck of overall size 12 m x 9 m X 6.9 as shown in drawings.

3.1.2 Umbilical Tower of overall size 4.2 m x 3 m X 33 m (variable at different sections along height) as shown in drawings.

3.1.3 Anchor legs (4 Nos.) on which MLS will be supported

3.1.4 Bearing plates (4 Nos) including the handling arrangement for the bearing plates which is mounted on the Anchor legs.

3.1.5 Replaceable Rings / Interface Rings to be located on the Central Annular structure.

3.1.6 Additional, anchor legs / bottom supports, lugs, bolts, nuts required during assembly of modules of MLS at shop and prior to welding of modules at site.

3.1.7 Painting of entire fabricated modules of MLS shall be carried out by vendor at vendor site as well as at site.

3.2 Preparation / Revision of Drawings and Documents

3.2.1 After the award of contract, the PURCHASER shall provide a set of fabrication drawings for the proposed Mobile Launch Structure to the CONTRACTOR. The CONTRACTOR shall prepare shop floor drawings in order to incorporate any subsequent modifications required in the drawings before and during the manufacture of MLS. Some of the conditions due to which modifications in drawings may be necessary are stated here below:

- Preparation / Revision of drawings to incorporate the Technical Deviations / Design modifications proposed by the CONTRACTOR and accepted by the PURCHASER.
- Preparation / Revision of drawings to incorporate modifications in the Mobile Launch Structure as specified by the PURCHASER after the award of contract.
- Any other changes in the design / drawings for MLS found necessary to be carried out during various stages of manufacture and erection of MLS

3.3 Shop Erection, Inspection & testing

3.4 Control assembly of MLS deck shall be offered for witness and inspection to Department, disassembly after match-marking, Packing and Forwarding, transportation to site, unloading & storage at site.

3.5 Erection, Commissioning and Acceptance Testing of MLS at SLC site at Madhavankurichi, Tuticorin, Tamil Nadu

3.6 Erection of one set of ground anchors for commissioning of MLS shall be carried out by contractor at SLC site at Madhavankurichi, Tuticorin, Tamil Nadu. The related minor civil works also shall be included in the scope of work under the contractor.

3.7 Erection of the other two ground anchor sets in locations identified by Department.

3.8 Grouting shall be carried out after levelling of ground anchors and presented to representative of Department for verification and clearance. The recommended compound is Fosroc Conbextra GP2 free flow, high strength, non-shrink cementitious precision grout or equivalent grout. The storage, handling and application of grout shall be in strict accordance with the manufacturer's instruction.

4.0 EQUIPMENT & SERVICES TO BE PROVIDED BY OTHERS NOT IN BIDDERS' SCOPE

4.1 Bogie with hauler and Jacking system for MLS

4.2 Rail track for movement of MLS (on bogie) at site

5.0 TECHNICAL SPECIFICATION OF MLS

The Mobile Launch Structure (MLS) is composed of the following major subassemblies / components:

a) Base structure (Pedestal Deck)
b) Central Annular Structure (CAS)
c) Umbilical Tower (UT)
d) Anchoring Interfaces

Apart from the MLS, the following interfacing members also are necessary for the functioning

e) SSLV Launch Interface Ring (SLIR)
f) Ground anchors (3 sets: each set comprising of 4 nos. of blocks)

A brief description of the constructional features required for each of the above subassemblies / components is listed here below:

5.1 PEDESTAL DECK

5.1.1 The Pedestal Deck shall be made of structural steel plates arranged in form of grid of multiple flanges and webs. The deck is designed to transfer the different loads

from SSLV vehicle and other applicable loads during the integration, transportation and final positioning at launch pad to the bogie system / anchor system. The MLS shall be manufactured so as to achieve the accuracy requirements specified for the top surfaces of CAS.

5.1.2 The bottom of the deck shall be at EL 2100 mm and the top of the deck shall be at EL 5500 mm. There shall be two intermediate levels at EL 2800 mm and EL 4800 mm also. The space between them serves as a passage all around the interior of the MLS. It has got openings for entry and exit. Suitable entry and exit openings shall be provided for ventilation and air-conditioning.

5.1.3 Bottom deck shall have interface plates for supporting MLS on wheel bogie that moves on rail track (indicated in drawings) and interface plates for supporting MLS on road moving Self Propelled vehicle (details will be given in fabrication drawings along with P.O).

5.1.4 To facilitate the fabrication, transportation, handling and erection of pedestal deck at site, the pedestal deck shall be made up of modules. The maximum size of the module, which can be transported, shall be restricted and suitable for road transportation. The proposed modules are to be configured based on the maximum size, and also the maximum weight to be handled for any module.

Refer drawing no. 10-STR-12-1-23/A1 for the proposed configuration and the sizes of various modules.

5.2 CENTRAL ANNULAR STRUCTURE (CAS)

It shall be a circular steel structure with height 1.1 m above the top of the pedestal deck. It shall include a replaceable interface ring of height 150 mm. The function of CAS is to transfer the vehicle load to the base structure.

CAS shall have a circular opening of 2800 mm diameter for exhaust of Jet.

5.3 UMBILICAL TOWER (UT)

5.3.1 The Umbilical Tower is fabricated as truss from extruded seamless structural steel sections and covered on the front side by steel plate

5.3.2 The Umbilical Tower shall be fixed vertically on the pedestal deck.

5.3.3 To facilitate the fabrication, transportation, handling and erection of Umbilical Tower at site, the structure shall be made up of modules.

5.4 ANCHOR LEGS AND GROUND ANCHOR SYSTEM

(a) The Pedestal Deck shall be supported on four Anchor Legs. The interface details of Ground Anchors shall be provided separately as per the existing system. The CONTRACTOR shall ensure that the Anchor legs are suitable for assembly with the Ground Anchors.

(b) The Anchor Legs shall also have the bearing plates and its handling arrangements. The bearing plates are used for creating a clearance between MLS and the bogie so that the bogie can be retracted.

(c) Bogie has to be positioned below MLS. A bearing plate is inserted between MLS anchor leg and ground anchor top surface to create clearance between

MLS and bogie by operating hydraulic jacking system in order to facilitate retraction of the bogie system after parking of MLS. When the MLS is on wheel bogie, the 40 mm thick bearing plate below anchor legs is removed.

(d) Scope of supply includes 4 nos. of bearing plates of 40mm thickness.

(e) Distance between anchor legs shall be maintained as 8.4m across the rail track and 11.4m along the rail track. The cross section of anchor legs shall be 600 mm (width) x 600 mm (depth) so as to have sufficient space for bogie movement as per drawings.

5.5 BOGIE SYSTEM WITH MLS RAIL RACK

(a) The CONTRACTOR shall ensure that the MLS to be supplied by him is suitable for assembly with the Bogie system. For this purpose, dimensional measurements at site to determine the 'AS BUILT' dimensions for all interfaces between MLS & Bogie may be carried out by CONTRACTOR and record shall be submitted to Department.

(b) MLS with a fully assembled SSLV vehicle will be transported on bogie system from SAF to launch pad.

5.6 ACCURACY REQUIREMENTS TO BE FULFILLED BY MLS

5.5.1. Top launch vehicle mounting surface accuracy for CAS shall be maintained less than 30 arc seconds.

5.5.2. The maximum absolute value of deflection on top of CAS shall be less than 1.5 mm under the condition of full vehicle load of 120 t loaded on the MLS.

5.5.3. The verticality tolerance of each floor of UT shall be limited within 5mm and overall H/1200 or 35mm whichever is lesser according to IS 12843.

5.5.4. Mutual out-of-plane tolerance for bogie-support-plates at four corners shall be ±0.5mm

6.0 INSTRUCTIONS FOR FABRICATION & ERECTION

As the system is used for launching operation, it demands workmanship of the highest order, in which high level of accuracy in the manufacture of various subassemblies is required in order to meet the stringent accuracy requirements specified for the vehicle mounting surfaces. General instructions for fabrication and Erection are specified in the subsequent clauses.

6.1 Rolled plates and extruded sections shall be protected from developing rust as per ISO8501 before taking up fabrication work.

6.2 All welding shall be carried out by qualified and approved welders following practices according to applicable standards.

6.3 Edge preparation shall be carried out for all plates before welding.

6.4 Unless otherwise specified in drawings, all butt welds shall be full penetration welds.

6.5 Unless otherwise specified on drawings, all fillet welds shall be 50% of the minimum plate thickness and shall be on both sides of the plate. Also, the weld shall be continuous.

6.6 Welding sequence shall be such that the distortion and residual stresses are minimised. All welds shall be deposited in proper sequence so as to balance the applied heat as far as possible. (A wandering sequence shall be used whenever necessary).

6.7 The procedure to be followed by CONTRACTOR for all weld repairs shall be subject to approval by the PURCHASER and TPI Agency.

6.8 Threaded joints that are to be seal welded shall be thoroughly cleaned before welding.

6.9 Stress relieving shall be carried out for all fabricated components prior to its machining. Stress relieving shall also be carried out for all the fabricated modules & Anchor legs of MLS before machining. Site welded modules shall be stress relieved in-situ.

6.10 In order to achieve the accuracy requirements specified for the top vehicle mounting surface of CAS, machining is required to be carried out at all interfaces between Anchor-legs / MLS / CAS / Replaceable rings. Interfaces between any two modules are also to be machined. Also, during erection at site, alignment of top surfaces of Anchor Legs & also of the top machined surfaces of MLS have to be monitored and controlled.

6.11 The MLS is made up of modules which have to be welded to each other at site. From past experience in manufacture of similar structure, it has been established that in order to achieve the final accuracy requirements for the top vehicle mounting surface of CAS, it is necessary to monitor & control the distortion taking place on the MLS during welding of the modules at site. Hence, it will be necessary to monitor the distortion of MLS & modify the sequence of welding as required in order to minimise / eliminate the distortion. The Contractor shall obtain sufficient clarity for monitoring and finalising the welding sequence during the welding of modules at site. In case of inadequate in-house competence, the Contractor may consider presenting the welding sequence to professional bodies like Welding Research Institute, Trichy at their own cost for review and clearance.

6.12 The assembly of complete MLS (inclusive of one set of Ground Anchors) is to be carried out at CONTRACTOR's works. For this purpose, the modules shall be rigidly bolted to each other through temporary lug supports which are to be welded on all the modules. Additional bottom supports / anchor legs shall also be provided to support the various modules of MLS during various stages of erection at CONTRACTOR's works.

6.13 After completion of assembly, the MLS shall be tested for compliance with assembly drawings and for its performance requirements (inclusive of demonstration of specified accuracy for the top vehicle mounting surfaces of CAS). After completion of testing and demonstration of performance requirements to the entire satisfaction of the PURCHASER, necessary dowels shall be provided between interfaces of all modules before dismantling of shop assembly.

6.14 Prior to welding of the various modules of MLS at site, the modules shall be again rigidly bolted to each other through the temporary lug supports which had been welded to the modules during the assembly at VENDOR's shop. Additional bottom supports / anchor legs shall also be provided to support the various modules of MLS during various stages of erection. After the modules are welded together, the temporary lugs welded to the modules are to be removed. All items like temporary lug supports, fasteners, additional bottom supports / anchor legs, special tools &

tackles etc. required during erection at CONTRACTOR's Works as well as at PURCHASER's site shall be supplied by the CONTRACTOR.

6.15 All Handling equipment with necessary tools, tackles and slings required for erection of MLS at site shall be provided by the CONTRACTOR. No handling equipment or inspection equipment shall be provided by the DEPARTMENT.

6.16 NO PURCHASER stores facility is provided for storing and erection works.

6.17 Preliminary specifications of MLS will be provided to bidder along with tender. But detailed fabrication drawings showing dimensional tolerances will be provided along with PO only.

7.0 CODES AND STANDARDS

7.1 All equipment, systems and works covered under this specification shall comply with all currently applicable statutes, regulations, standards and safety codes in the locality where the equipment will be installed.

7.2 In particular, the latest editions of following standards are applicable:

Steel for general structural purposes	IS 2062
Rolled Sections and Special sections	IS 808, IS 1161, IS 1173, IS 1252, IS 1730, IS 1731, IS 1732, IS 1863, IS 1864, IS 2314, IS 4923
Fabrication & tolerances	IS 12843, IS 7215

7.3 Other national standards established to be equivalent or superior to the codes and standards specified are also acceptable. The BIDDER shall furnish English translation of all standards specified in this specification.

7.4 In the event of any conflict between the codes and standards referred to in the specification and the requirements of this specification, the more stringent of these requirements shall govern.

7.5 Unless indicated otherwise, all codes and standards referred to in this enquiry specification shall be understood to be the latest version on the date of offer made by the Bidder.

8.0 SPECIFIC REQUIREMENTS / INSTRUCTIONS TO BIDDERS

8.1 BIDDER'S OFFER

8.1.1 In case of any deviations from the technical specifications, the BIDDER shall indicate the same in Schedule of deviations. If no deviations are listed in the schedule of deviations, it shall be considered that the BIDDER complies in total with the technical specifications. Any deviations indicated elsewhere other than schedule of deviations in the offer will not be accepted.

8.1.2 The BIDDER is advised to furnish all information called for in summary of data to be furnished along with the bid (Clause 14.0 of this section)

8.1.3 BIDDER is advised to quote for the complete scope and partial response will not be entertained. In case of few items which do not directly fall under BIDDER's manufacturing range and / or not available from indigenous source, BIDDER should take the responsibility upon themselves to arrange to procure them and supply to ensure that their offer is complete in all respects.

8.2 All bought out items supplied shall have capacities not less than those stated in this specification and necessary test certificates shall be furnished in this regard. However, if the BIDDER considers that higher capacity is required to meet guarantee requirements, he should offer the same and substantiate the same by calculations.

8.3 The BIDDER shall suggest any modifications which he considers are necessary for him to carry out, in order to meet the fabrication requirements. The details of design modifications proposed to be carried out shall be attached as Annexure to the Schedule of Deviations from Technical Specifications.

8.4 Any items which may not have been specifically mentioned herein but are needed to complete the equipment / system shall also be treated as included and the same shall also be furnished and erected, unless otherwise specifically excluded as indicated.

8.5 All tools and tackles required during various stages of execution of order right from manufacture at shop to the erection and testing at site shall be in the scope of the Contractor.

9.0 INSPECTION AND TESTING PROCEDURES AND SCOPE OF INSPECTION

9.1 Raw Material Inspection shall be carried out at the Vendor's works for compliance of the raw materials to the specified standards.

9.2 Bought out components shall be inspected either at Vendor's works or at the Sub-contractor's premises for compliance with the Specifications.

9.3 Fabricated components shall be inspected at the Vendor's works for compliance with the component drawings. Sub-Assemblies shall be inspected at the Vendor's works for compliance with the Sub-Assembly drawings and for performance requirements. Also, full Assembly of the MLS shall be inspected at Vendor's works after shop assembly for compliance with assembly drawings and performance requirements.

9.4 Full Assembly of the MLS shall be inspected at specified delivery premises (SLC site) assembly for compliance with the Assembly Drawings and performance requirements.

9.5 Third party inspection by M/s Lloyds / M/s M N Dastur / M/s Bureau Veritas / M/s Det Norse Veritas duly approved by the PURCHASER shall be arranged by the CONTRACTOR for the inspection of all raw material / Boughtout components, inspection during various stages of manufacture at CONTRACTOR's / SUB-CONTRACTOR's works and also for the inspection to be carried out during erection, performance testing and commissioning at site. All charges towards the third party inspection shall be borne by the CONTRACTOR.

9.6 After the award of contract, CONTRACTOR shall prepare detailed Quality Assurance Plan (QAP) for inspection & testing of all subassemblies / components of the Mobile Launch Structures. The QAP shall be reviewed and approved by the Third Party Inspection Agency and the PURCHASER. Indicative QAPs for MLS is enclosed in Section C4 respectively of this specification.

9.7 The procedure to be followed for testing the accuracy requirements for the top vehicle mounting surface of CAS shall be prepared by the contractor and submitted to department's review and approval.

9.8 All measuring and testing instruments / equipment required for carrying out all tests at VENDOR's works and at PURCHASER's site shall be provided by the Contractor.

9.9 CONTRACTOR shall furnish calibration certificates for the instruments to be used for testing at shop and site. The calibration certificates furnished by the CONTRACTOR shall not be more than 12 months old.

10.0 GUARANTEES AND PERFORMANCE REQUIREMENTS

The Mobile Launch Structure shall perform satisfactorily to meet the guarantee requirements stated in this specification to the entire satisfaction of the PURCHASER.

11.0 ACCEPTANCE TEST

11.1 After the entire installation work has been completed, the CONTRACTOR shall make all required adjustments until all guaranteed performance requirements are met. All instruments, services required for the above tests shall be furnished by the CONTRACTOR.

11.2 If the stipulated performance requirements are not fulfilled, the CONTRACTOR shall make good the deficiency by providing it in every case, by altering and/ or replacing the parts or the whole equipment / system free of charge to the PURCHASER immediately. All rejected equipment shall be removed from the site at CONTRACTOR's expense.

11.3 For performing the load test on MLS, the hardware suitable in size to be positioned on the CAS shall be provided by the Department. Supplier shall fill the hardware with dead load amounting to 120t.

12.0 SURFACE PREPARATION AND PAINTING

The complete MLS shall be painted as per the instructions for painting enclosed as Section D of this specification.
The painting of MLS shall be carried out as per Section D of this specification as well as the PURCHASER's specific instructions for painting after the award of contract.

13.0 DATA TO BE FURNISHED ALONG WITH BID AND AFTER AWARD OF CONTRACT

The BIDDER shall ensure the following documentation are prepared and submitted to PURCHASER for his review / record.

13.1 ALONG WITH BID

13.1.1 Description of the item offered along with catalogues, drawings, etc. along with deviations from Technical Specification and proposed Design modifications.

13.1.2 All data sheet of the tender specification, duly filled in as applicable.

13.1.3 Project execution plan.

13.1.4 Bar chart for supply & erection schedule indicating the date of completion of various activities so as to complete the execution of the contract within the time frame stipulated in the tender specification.

13.1.5 All section F's duly filled in.

13.1.6 Write-up on procedure proposed to be followed for erection of MLS to achieve the accuracy requirements specified for the top vehicle mounting surfaces of Replaceable ring/CAS.

13.2 AFTER AWARD OF CONTRACT

13.2.1 Schedule of Assembly & Detailed drawings and documents to be submitted for review & approval with submission dates.

13.2.2 Quality Assurance Plan (QAP)

13.2.3 Bar chart for supply & erection schedule indicating the date of completion of various activities so as to complete execution of the contract within the time frame stipulated in the LOI / Purchase order.

13.2.4 Progress Reports

13.2.5 As-built drawings.

13.2.6 Quality Assurance documentation compiled for the project.

13.2.7 The above list of documents is indicative and not exhaustive. The BIDDER / CONTRACTOR shall submit documents as specified in various sections of this specification and also as per the specific instructions of the PURCHASER.

14.0 FINAL DOCUMENTS

TWO SETS OF THE FOLLOWING DOCUMENTS AND DRAWINGS ARE TO BE SUBMITTED ALONG WITH FINAL HANDOVER DOCUMENTS.

14.1 Quality assurance documentation compiled for the project.

14.2 Final as built drawings

WELDING SPECIFICATION FOR SHOP AND SITE FABRICATED ITEMS

1. SCOPE

1.1. This specification shall apply to shop and site fabrication of all welded joints in carbon steel and low alloy steel. The specification shall apply to all the joints indicated below:

(a) Butt joints produced by double sided welding which produce the same quality of deposited weld metal on both inside and outside weld surfaces

(b) Butt joints produced by single sided welding having backing strip which remains in place and full penetration butt weld without backing strip

(c) Corner or those joints connecting two (2) members approximately at right angles to each other in the form of L or T Partial penetration welds of the groove type which are used for connections not subjected to external loading

(d) Fillet welded joints of approximately triangular cross-section joining two surfaces at approximately right angles to each other and having a throat dimension at least 70% of the thinner of the parts being joined but not less than 6 mm

1. Welds attaching nozzles and other connections
2. Welds which are used to join non-pressure parts like supports, lugs, brackets, stiffeners and other attachments to the vessel wall

Any other similar joint which is not specified above but may be encountered during fabrication

2. CODES AND STANDARDS

2.1. The welding equipment, welding consumables, preheating, Post weld Heat Treatment (PWHT), other auxiliary functions and welding personnel shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment are to be fabricated and installed. Nothing in this specification shall be construed to relieve the CONTRACTOR of this responsibility. Specifically, the latest editions of the codes and standards listed below shall apply:

(a) ASME Boiler and Pressure Vessel Code (BPV Code), Section II Part C - Material Specifications for Welding Rods, Electrodes, and Filler Metals
(b) ASME BPV Code, Section V - Non-destructive Examination (NDE)
(c) ASME BPV Code, Section VIII Division 1- Rules for Construction of Pressure Vessels
(d) ASME BPV Code, Section IX - Welding and Brazing Qualifications
(e) American Society of Non-destructive Testing (ASNT) SNT-TC-IA-Recommended Practice
(f) Indian Boiler Regulations (IBR)
(g) Any other codes and standards specified in Section C or data sheet A of Section D of enquiry specification

2.2. The codes and standards listed in para 2.1 forms an integral part of this specification. In the event of conflict between this specification and the codes and standards, the more stringent shall govern.

2.3. If no specific requirements are given in this specification, the requirements of the applicable code shall govern.

3. WELDING PROCESSES

The following welding processes shall be used:

3.1. GAS TUNGSTEN ARC WELDING (GTAW)

3.1.1. The root pass of single-sided groove welds without backing

3.1.2. Full penetration nozzle connection where other side is inaccessible

3.1.3. Any butt and fillet weld on equipment with thickness 5 mm or less

3.1.4. For all passes of butt and fillet welding of nozzles on equipment and integral piping of size 50 mm NB or smaller

3.2. SHIELDED METAL-ARC WELDING (SMAW)

3.3. SUBMERGED ARC WELDING (SAW)

3.3.1. Maximum weld deposit per pass shall be 12.7 mm for carbon steel (P-1) and 9.5 mm for other materials.

3.4. Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW) processes

3.5. Other processes such as plasma-arc and electro-slag welding may be used only with the approval of the PURCHASER and depending upon the process and application proposed. These processes may require testing in addition to that specified by the governing procedure qualification code.

3.6. Table 1 gives recommendations for welding processes to be used for carbon, low alloy and austenitic stainless steels.

4. WELDING CONSUMABLES

4.1. The CONTRACTOR shall provide, at no additional cost, all the welding consumables such as electrodes, filler wires, flux, oxygen, acetylene and argon etc., in order to complete the welding in all respects. The consumables shall be from reputed and approved manufacturers. All the consumables shall be approved by the PURCHASER.

4.2. The electrodes and filler wires shall be of the class specified in Table 1 Welding Specification Chart.

4.3. Electrode qualification test records shall be submitted for the PURCHASER's approval. The CONTRACTOR shall also submit batch test certificates from the electrode manufacturer for physical and chemical tests.

4.4. Electrodes shall be in sealed containers and adequate care shall be taken for storage, strictly in accordance with the manufacturer’s recommendations.

4.5. Electrodes, which have been removed from the original containers, shall be kept in baking ovens as per the manufacturer's recommendations and, once these are taken out, shall be consumed within the time limits stipulated by the manufacturer. Care shall be taken in handling the electrodes to prevent any damage to the flux covering. Portable ovens shall be used for carrying the electrodes from the main oven to the field. Electrodes of different specifications shall be stored in different compartments of a baking oven to avoid mix up.

4.6. The electrodes, filler wires and flux used shall be free from contamination such as rust, oil, grease and such foreign matter.

4.7. Low hydrogen electrodes shall be used for weld joints in carbon steel if the wall thickness exceeds 19 mm and low alloy steel of all thicknesses except that non-low hydrogen electrodes shall be permitted for the root pass of carbon steel only.

5. WELDING QUALIFICATIONS

5.1. Qualification of the welding procedures to be used and the performance of welders and welding operators shall conform to the requirements of the BPV Codes and Section IX. For equipment under the purview of IBR, these shall also meet the requirements of IBR.

5.2. No production welds shall be undertaken until the qualification requirements are completed to the satisfaction of the PURCHASER/TPIA.

5.3. When impact testing is required by the code or by the specification, these requirements shall be met in qualifying welding procedures.

5.4. The CONTRACTOR shall be responsible for qualifying any welding procedure, welders and welding operators intended to be deployed. The CONTRACTOR shall submit the Welding Procedure Specification (WPS) for acceptance by the PURCHASER. After approval by the PURCHASER/TPIA, the procedure qualification test shall be carried out by the CONTRACTOR, at his own expense, duly witnessed by the PURCHASER/TPIA. A complete set of test results, in specified format, shall be submitted to the PURCHASER and TPIA for approval immediately completion of procedure qualification test. All tests as required by the BPV code Section IX or IBR shall be carried out. The WPS shall require re- qualification, if any of the essential variables or supplementary variables is altered.

5.5. Welders and welding operators shall be qualified in accordance with BPV Code and Section IX or IBR, as applicable. The qualification shall be carried out in the presence of the PURCHASER. Only those welders and welding operators who are qualified by the PURCHASER shall be deployed on the job. For equipment under the purview of IBR, approval of the local IBR inspector shall be obtained by the CONTRACTOR.

5.6. Welders and welding operators shall always keep their identification cards with them and shall produce them on demand. The CONTRACTOR shall issue the identity cards after the same are duly certified by the PURCHASER/TPIA. Welder or welding operator, who is not in possession of the identity card, shall not be allowed to work.

5.7. The CONTRACTOR shall use forms as per BPV code, section IX, form QW-482, form QW-483 and form QW-484. Other forms are also acceptable subject to approval by the PURCHASER.

5.8. Unless agreed otherwise, the CONTRACTOR shall advise the PURCHASER, in writing, at least three (3) weeks before any welder or welding operator is deployed on the work, the names and qualifications of the proposed welders, welding operators and welding supervisors. It shall be the CONTRACTOR's responsibility to ensure that all welders and welding operators employed by him or his SUB-VENDORS/SUB-CONTRACTORS, on any part of the work either in the CONTRACTOR's or his SUB-SUB-CONTRACTOR's works or at site are fully qualified as required by the code. Each welder and welding operator shall qualify for all types of welds, positions and materials or material combinations he may be called upon to weld.

5.9. Should the PURCHASER require to qualify or requalify any welder or welding operator, the CONTRACTOR shall make available, at no extra cost to the PURCHASER the men, equipment and materials for the tests. The cost of testing the welds shall be borne by the CONTRACTOR.

5.10. Welding supervisors shall have qualifications such as engineering degree or engineering diploma in welding technology with adequate knowledge of welding consumables, welding machines, NDE and a minimum of five (5) years of experience in supervising welding of joints.

5.11. All welding, including the tacking up of all welds shall be carried out by qualified welders and welding operators as per approved WPS. Any weld made by other than a qualified welder or welding operator or not carried out as per approved WPS shall be cut out and re-welded.

5.12. For purposes of identification and to enable tracing full history of each joint, each welder and welding operator employed on the work shall be given a designation.

5.13. The welder and welding operator's designation and the date on which the joint was made, shall be stamped near the relevant joint and on the relevant drawings also. Copies of the drawings so marked shall be furnished to the PURCHASER for record purposes. For austenitic stainless steels, welder and welding operator's designation shall be applied with water -proof paint or by etching or stencilling machine that is not detrimental to the metal. Alternatively, record cards may be used.

5.14. For each welder and welding operator, a record card shall be maintained showing the procedures for which he is qualified. These cards shall note the production welds, the date of the welding done, the type of defects produced and their frequency. The record shall be reviewed once in a week by the PURCHASER and those welders and welding operators whose work required a disproportionate amount of repair shall be disqualified from welding. Re-qualification of welders and welding operators disqualified more than three (3) times shall be entirely at the discretion of the PURCHASER. As far as possible, the qualification shall be carried out at the location (site or shop) where the actual fabrication and welding work is to be carried out.

6. PREPARATION FOR WELDING

6.1. Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects, which would adversely affect the quality of the weld. All welding faces and adjoining surfaces, for a distance of at least 50 mm from the edge of the welding groove or 12 mm from the toe of the fillet in the case of socket welded or fillet welded joints, shall be thoroughly cleaned of rust, scale, paint, oil or grease, both inside and

outside.

6.2. Joints for welding shall be as per the project specifications and approved fabrication drawings.

6.3. Butt joints shall be prepared as per ASME BPV Code Section VIII Division 1, unless specified otherwise. For equipment under the purview of IBR, these shall be as per IBR. Any other end preparation which meets the WPS is acceptable.

6.4. Internal misalignment shall be reduced by trimming but such trimming shall not reduce the finished wall thickness below the required minimum wall thickness. Trimming shall not be abrupt. It shall be tapered with a minimum slope of 1:3. Root opening of the joint shall be within the tolerance limits of the WPS.

6.5. Welds shall be as per ASME BPV Code Section VIII Division 1 or in accordance with IBR for equipment under the purview of IBR.

6.6. Reinforcing pads and saddles shall have a good fit with the parts to which they are attached. A tell-tale hole shall be provided on the side of any pad or saddle to reveal leakage in the weld and to allow venting during welding and heat treatment. Pad or saddle shall be added, after the branch weld has undergone satisfactory visual and NDE.

6.7. The ends shall be prepared by machining, grinding, flame cutting or plasma cutting. Where flame cutting is used, the effect on the mechanical and metallurgical properties of the base metal shall be taken into consideration.

6.8. Flame cutting of alloy steel is not advisable. If alloy steel is cut using flame, the ISSUE heat affected zone shall be removed completely by grinding and/or machining. Magnetic Particle (MT) or Liquid Penetrant (PT) testing shall be carried out to ensure soundness of edges. However, flame cutting of carbon steel is permitted. Wherever practicable, flame cutting shall be carried out by machine. Machine flame-cut edges shall be substantially as smooth and regular as those produced by edge planning and shall be cleaned free of slag. Manual flame cutting shall be permitted only where machine flame cutting is not practicable and with the approval of the PURCHASER, and such surfaces shall be ground or dressed to a smooth finish as required by the specification and to the satisfaction of the PURCHASER. Slag, scale or oxides shall be removed by grinding to bright metal at least two (2) mm beyond the burnt area.

6.9. Thermal cutting of carbon steel shall be performed under the same conditions of preheating and PWHT as for the welding of each class of material. However, PWHT is not required when:

(a) The heat affected zone produced by thermal cutting is removed by mechanical means immediately after cutting. However, in any case, all remaining slag, scale or oxides shall be removed by grinding to bright metal at least two (2) mm beyond the burnt area, or

(b) Thermal cutting is part of fabrication, manufacturing or erection sequence leading to a weld end preparation where welding immediately follows.

6.9 On austenitic stainless steels, plasma cutting, machining or grinding methods shall be used for edge preparation. Flame cutting is not permissible. Cut surfaces shall be

machined or ground smooth after plasma cutting. Stainless steel materials shall be ground with Al_2O_3 grinding wheels and cleaned with stainless steel wire brushes.

6.10 Before fitting up the weld joint, the profile and dimensions of the weld end preparation shall be checked by the PURCHASER. If the specified tolerances are exceeded, this shall be corrected (with prior approval) by grinding, machining or any other method acceptable to the PURCHASER.

6.11 Fit-ups shall be examined by the PURCHASER/TPIA prior to welding the root pass.

7. TECHNIQUE AND WORKMANSHIP

7.1. Components to be welded shall be aligned and spaced as per the requirements of the code and WPS.

7.2. Alignment and spacing shall be achieved using suitable wires to maintain the gap. These shall be removed after tack welding. The ends to be welded shall be held using suitable clamps, yokes or other devices which will not damage the surfaces in any manner. It shall be ensured that welding operations do not result in distortions.

7.3. Earthing shall be provided on the job using earthing clamps of similar material as ISSUE the job. Earthing shall not be given through welding rotators.

7.4. Tack welds at the root joint, for maintaining joint alignment, shall be made only by qualified welders or welding operators and with filler metal equivalent to that used in the root pass. Tack welds shall be fused with the root pass weld, except that those which have cracked shall be removed. Peening is prohibited on the root and final passes of a weld. The required preheat shall be maintained prior to tack welding. Means shall be made available to measure preheat temperature.

7.5. No welding shall be carried out if there is any impingement in the weld area of rain, snow, excessive wind or if the weld area is wet.

7.6. Irrespective of the class of steel, root runs shall be made without interruption other than for changing the electrodes or to allow the welder or welding operator to reposition him. Root runs made in the shop may afterwards be allowed to cool by taking suitable precautions to ensure slow cooling e.g. by wrapping in a dry asbestos blanket. Welds made at site shall not be allowed to cool until the thickness of weld metal deposited exceeds one third of the final weld thickness or 10 mm, whichever is greater.

7.7. When welding alloy steels, it is strongly recommended that interruption of welding be avoided. Where such interruption is unavoidable, either the preheat shall be maintained during the interruption or the joint shall be post heated or wrapped in dry asbestos blankets to ensure slow cooling. Before recommencing welding, preheat shall be applied again.

7.8. Welded-on bridge pieces and temporary attachments shall preferably be avoided. Where approved by the PURCHASER, these may be used. Material of these shall be compatible with material with which they are temporarily welded. All such pieces shall be removed after welding of joints and the weld area ground flush. These areas shall be subjected to MT and PT examination. These pieces shall be welded by qualified

welders and welding operators and with electrodes compatible with the parent material. The preheating requirements of material shall be applied and maintained during the welding of attachments. These temporary attachments shall be removed by grinding, chipping, sawing or by arc or flame gouging. When arc or flame gouging is used, at least three (3) mm of metal shall be left around the surface which shall be removed by grinding. This metal shall not be removed by hammering or by use of force.

7.9. The arc shall be struck only on those parts of parent metal where weld metal is to be deposited. When inadvertent arc-strikes are made on the base metal surfaces outside the joint groove, the arc-strikes shall be removed by grinding and shall be examined by MT and PT procedures.

7.10. Oxides shall not be permitted to form during welding or heat treatment or both, on the internal surfaces which will not be subsequently cleaned. Inert gas purging is an acceptable method to prevent such oxidation. All joints in materials which contain more than 1¼ % chromium shall be purged to assure that less than 1% of oxygen is present on the joint underside before initiation of the welding. The purging operation shall be maintained for a minimum of two (2) passes.

7.11. Argon gas used in GTAW process for shielding and purging shall be at least 99.95% pure. Purging shall be carried out at a flow rate depending on diameter until at least five (5) times the volume between dams is displaced. In no case shall the initial purging period be less than 10 minutes. After initial purging, the flow of the backing gas shall be reduced to a point where only a slight positive pressure prevails. Any dams used in purging shall be fully identified and removed after welding and accounted for in order to avoid leaving them in the system. The rate of flow for shielding purposes shall be established in the procedure qualification.

7.12. Thorough check shall be exercised to maintain the required inter-pass temperature.

7.13. All equipment necessary to carry out the welding, for supporting of the work, for preheating and PWHT including thermal insulation for retaining the heat and for the protection of the welder and welding operator shall be provided by the CONTRACTOR at no extra cost. All necessary precautions shall be taken during cutting and welding operations. It shall be ensured that proper ventilation is available in the welding area and adequate protective gear such as goggles, masks, gloves, protection for the ears and body are used at all times. For guidelines refer ASME standard Z49.1, “Safety in Welding and Cutting”.

7.14. After deposition, each layer of weld metal shall be cleaned with a wire brush to remove all slag, scale and defects, to prepare for the proper deposition of the next layer. The material of wire brush shall be compatible with parent material. Stainless steel materials shall be cleaned with grinding wheels or stainless-steel brushes which have not been used on other materials. Either aluminium oxide or silicon carbide grinding wheels shall be used. Special care shall be taken to secure complete and thorough penetration of the fusion zone into the bottom of the weld. It is recommended that the root run be checked by MT or PT procedures for critical equipment.

7.15. If specified, upon completion of welding, the joints shall be wrapped in dry asbestos blankets to ensure slow cooling, unless PWHT is applied immediately.

7.16. No welding or welded parts shall be painted, plated, galvanised or heat treated

until inspected and approved by the PURCHASER. Welds shall be prepared and ground in such a way that the weld surfaces merge smoothly into the base metal surface, particularly for welds which are to undergo NDE.

7.17. Except where necessary to grind flush for NDE, reinforcement for butt welds may be provided. The height of such reinforcement shall meet the requirements of the code. The reinforcement shall be crowned at the centre and tapered on each side of the joined members. The exposed surface of the weld shall be ground where required to present a workmanlike appearance and shall be free from depressions below the surface of the joined members. The exposed surface of the butt welds shall be free from undercuts, overlaps or abrupt ridges or valleys and shall merge smoothly into the surface at the weld toe.

7.18. Repair of weld metal defects shall meet the requirements of the code.

7.19. Any weld repair shall be subject to the approval of the PURCHASER.

7.20. In the event of several unsuccessful repair attempts or if the PURCHASER feels that a satisfactory repair is not feasible, the joint shall be completely remade.

7.21. It is preferable to use welding rectifier or DC generator for welding of austenitic steels and while using low hydrogen electrodes.

7.22. IDENTIFICATION OF WELDS

7.22.1. Wherever code symbol stamps are required on carbon steel and ferritic alloy steel they shall be applied directly on to the member with low stress dotted design metal die stamps or to a small stainless steel plate especially provided for such marks. These plates shall be lightly tack welded using electrodes, of diameter three (3) mm or less, of the type specified for the material. Before making the required tack weld, the material in the immediate surrounding area shall be preheated, as required, by electric means or propane or natural gas burners. Cooling shall take place under asbestos insulation in a draft-free area. Stress relieving of these welds is not required. Steel stamping directly on the surface of alloy steel with other than low stress die stamps shall not be used.

7.23. SEAL WELDS

7.23.1. Seal welding shall be carried out by qualified welders and welding operators and in accordance with approved drawings.

7.23.2. Threaded joints that are to be seal welded shall be made without the use of thread lubricating compound. Seal weld shall cover all exposed threads.

7.24. WELD ENCROACHMENT AND MINIMUM DISTANCE BETWEEN WELDS

7.24.1. Welded joints, more specifically longitudinal welds, shall be placed not closer than 50 mm to opening or branch welds, reinforcements, attachment devices or from supports etc. In case of deviation, the PURCHASER may specify additional NDE.

7.24.2. The longitudinal welds of two adjacent components shall be staggered by at least 30°. The minimum distance between welds shall be 50 mm or three (3) times the wall thickness, whichever is greater. Intersection of welds shall be avoided as

far as possible. If such welds are present, they shall be subject to suitable NDE at the discretion of the PURCHASER.

8. PREHEATING

8.1. Preheating prior to tack welding, welding and thermal cutting shall be used as a means of crack prevention and improving weld reliability. The general requirements of PWHT also apply to preheating.

8.2. Preheating shall be used as per the recommendations of ASME BPV Code Section VIII Division 1. For equipment under the purview of IBR, the requirements of IBR shall govern. Preheating of austenitic stainless steels is not required, except at low ambient temperatures, in which case a minimum preheat temperature of 10°C is recommended. Table 2 gives the requirements of preheating for commonly used materials.

8.3. The preheating zone shall extend 75 mm or a distance equal to four (4) times the material thickness, whichever is greater, beyond the edge of the weld.

8.4. The preheat temperature shall be measured at least 75 mm away from the weld preparation.

8.5. Where preheating is specified, welding shall continue without interruption. In case interruption cannot be avoided, preheating shall be carried out before re-commencement of welding.

8.6. Oxy-acetylene preheating shall not be applied.

8.7. For preheating, fuel gas/air torches, burner systems (high velocity gas or oil burners) or electrical heating may be used either locally or in a furnace. For preheating above 250ºC, electric heating (resistance or inductive heating) is recommended.

8.8. Approved temperature - indicating crayons, thermocouples or digital contact or laser pyrometers shall be used to measure preheat and inter-pass temperatures. A calibration report of the pyrometers and thermocouples shall be available.

8.9. When the preheat temperature is 150°C or higher, the metal shall be maintained at or above the preheat temperature until the weld is completed.

8.10. The welding of groove welds in low alloy steels of P-3 to P-5 groups with wall thickness of 19 mm or greater may only be interrupted, provided at least 10 mm of weld metal is deposited, or 25% of the welding groove is filled, whichever is greater. If the welding is interrupted prior to the above, the weld area shall be adequately covered with insulating material to ensure slow cooling. After cooling and before welding is resumed, visual examination of the weld shall be performed to assure that no cracks are formed. Required preheat shall be applied before welding is resumed.

9. POSTWELD HEAT TREATMENT

PWHT shall meet the requirements of ASME BPV Code Section VIII Division 1. Table 3 summarises the PWHT requirements for commonly used materials. For equipment under the purview of IBR, PWHT shall be as per IBR.

9.1. GENERAL REQUIREMENTS

9.1.1 A complete automatic temperature recording shall be made of preheating and stress relieving operations. Where propane gas burners or electrical resistance coils are employed, a complete temperature record of the preheating and stress relieving operation shall be made by means of a box type potentiometer. Other means of recording temperatures are permissible subject to the PURCHASER's approval.

9.1.2 Stress relief may be local or full furnace. Local stress relief shall be performed with electric induction or electric resistance coils. Suitable gas burning equipment using natural gas or propane may be employed.

9.1.3 At no time during a stress relieving/preheating cycle shall any water or liquid cooling medium be employed.

9.1.4 Where members being joined are unequal in thickness, the dimension of the heavier section shall govern the selection of width of the heated band and the duration of the holding period shall be based on maximum weld thickness.

9.1.5 For local stress relief, using electrical methods, a minimum of two (2) thermocouples tack-welded to the surface and potentiometers shall be used on the part under at least four (4) layers of asbestos paper. The hot junctions of the thermocouples shall be located on either side of the joint at least 12 mm from the edge of the joint but no further away than 100 mm. When employing induction heating, at least six (6) turns of induction cable shall be used on each side of the weld. Induction coils shall be wrapped on top of the asbestos paper protecting the thermocouples with the first turn approximately 150 mm from the centre of the weld.

9.1.6 Local stress relief using gas torches or ring burners may be employed. However, the procedure shall be limited to small items and shall be approved by the PURCHASER.

9.1.7 The stress relieving temperature shall be maintained for a period of time proportioned on the basis of one (1) hour per 25 mm of weld thickness at the joint, but in no case less than one (1) hour.

9.1.8 For piping joints and socket welded joints, pads, bosses, branch welds and couplings, one (1) thermocouple shall be positioned at a minimum distance of two (2) pipe wall thicknesses from the weld.

9.1.9 Equipment on both sides of any joint shall be adequately supported throughout the preheating, welding and stress relieving operations to prevent distortion.

9.1.10 All heating and cooling rates shall be maintained as per ASME BPV Code and time-temperature charts from the recorder shall be made available for review and acceptance.

9.1.11 The CONTRACTOR shall submit a detailed written procedure for the PWHT for the approval of the PURCHASER.

9.2. CARBON STEEL

9.2.1 Welded joints in carbon steel shall be stress relieved, upon completion of the welding operation, in accordance with Table 3.

9.2.2 When local stress relief is employed, the welded joint shall be heated to a temperature of not less than 600°C. The temperature level shall be maintained between 600 and 650°C, one (1) hour per 25 mm of weld thickness but in no case less than one (1) hour. The weld area shall then be allowed to cool undisturbed in still air to a temperature not exceeding 315°C.

9.2.3 Heating and Cooling

Carbon steels, after having reached their specific stress relief temperatures, may be cooled in the furnace or under wraps, i.e., leaving the induction coils or resistance heaters and insulation in place. This means that, at the stress relief temperatures, the power to the furnace or heating coils may be shut off and cooling takes place in the furnace or with all insulation and coils remaining on the part. For furnace stress relief, the doors of the furnace may be opened after the power is shut off, at or below 315°C. Thermocouples controlling the temperatures shall remain during the cooling cycle so that excessive cooling, if it occurs, can be observed and immediately corrected. The stress relieving coils and insulation shall only be removed after the part has cooled to below 315°C or if stress relieved in a furnace the part may be removed from the furnace and permitted to cool in still air at a temperature not below 10°C.

9.3. ALLOY STEEL

9.3.1 Welds in alloy steel shall be stress relieved after the welding operation in accordance with Table 3. After welding, the material shall be wrapped in asbestos and allowed to cool slowly if PWHT is not carried out immediately.

9.3.2 For full furnace stress relief of a welded assembly, the entire fabricated section shall be heated uniformly to the temperature specified. The temperature shall be maintained for a period of time proportioned on the basis of one (1) hour per 25 mm of weld thickness of the piece having the greatest weld thickness in the furnace charge, but in no case, less than one (1) hour.

10. ELECTRODES

10.1.The specification and size of the electrodes, voltages and amperages, thickness of beads and number of passes shall be as specified in the approved welding procedure or otherwise agreed in writing. Only basic coated electrodes shall be used, which will deposit weld metal having the same or higher physical properties and similar chemical composition to the members being joined. For each batch of approved brand, certificate showing compliance with the specification shall be submitted to the PURCHASER for review before being released for use. All electrodes shall be purchased in sealed containers and stored properly to prevent deterioration. As welding electrodes deteriorate under adverse conditions of storage leading to dampness in the electrode coating, they shall normally be stored in dehumidified air-conditioned rooms or in hot boxes or ovens in their original sealed containers whose temperatures shall be maintained within specified limits. The condition of electrodes shall be frequently inspected.
10.2.Electrodes with damage to coating shall not be used. Electrodes shall remain ISSUE identified until consumed. It is preferable to procure low hydrogen electrodes in hermetically sealed containers and preserve them without damage to the containers.

10.3.All low hydrogen electrodes, after baking as per the manufacturer's recommendations, shall be stored in ovens kept at 80 to 100°C before being used. Recommendations of the electrode manufacturer shall be strictly followed. Until the electrodes are taken out for welding, they shall be stored in portable ovens. The electrodes shall not be exposed to open atmosphere.

10.4.For welding of all grades of steel and alloys by the GTAW process, a 2% thoriated tungsten electrode conforming to SFA-5.12-86 EWTh-2 (AWS-A5.12-80, EWTh-2) classification shall be used.

10.5.All electrodes to be used on alloy and carbon steel shall conform to ASME BPV Code Section II Part C or any other equivalent code.

10.6.The type of electrodes used shall be only those recommended by the manufacturer for the use in the position in which the welds are to be made.

10.7.Current and polarity shall be maintained as recommended by the electrode manufacturer.

11. INSPECTION AND TESTING

11.1.The PURCHASER shall have free access to inspect welding or any other related operations at any time and at any stage of fabrication.

11.2.The PURCHASER may require NDE of any weld for reasons other than those given in the specification. The responsibility for the cost of such testing shall be mutually decided between the PURCHASER and the CONTRACTOR.

11.3.The CONTRACTOR shall inform the PURCHASER when the weld preparation and set-up for welding of various members selected by the PURCHASER are in progress so that the PURCHASER can inspect the assembly before welding starts.

11.4.The responsibilities of the PURCHASER's representative shall in no way reduce the CONTRACTOR's responsibilities to ensure that the work is carried out in accordance with the specification.

11.5.Any examination by NDE methods shall be performed before or after PWHT based on the applicable code requirements.

11.6.For a welded branch connection and for any weld, necessary repairs and NDE shall be completed before any reinforcing pad is added.

12. EXAMINATION OF WELDS

12.1. Examination refers to the quality control functions performed by the VENDOR / CONTRACTOR during fabrication, erection and testing.

12.2. As a minimum, the following shall be examined by visual examination:

(a) Materials and components to ensure that these are as per the specification and are free from defects. If defects are noticed on "free-issue" items, these shall be brought to the notice of the PURCHASER without delay.
(b) Joint preparation and cleanliness
(c) Fit-up, joint clearance, and internal alignment prior to joining
(d) Preheating as applicable
(e) Variables specified by the welding procedure, including filler material,

position and electrode

(f) Condition of the root pass after cleaning - external and where accessible, internal

(g) Slag removal and weld condition between passes

(h) Appearance of the finished joint and weld dimensions

12.3. Acceptance for the visual examination shall be as per ASME BPV Code Section VIII Division 1 or IBR as applicable.

13. QUALIFICATION AND CERTIFICATION OF NDE PERSONNEL

13.1.Approved and documented NDE procedure prepared by level III personnel shall be made available.

13.2.The CONTRACTOR's examining personnel shall have training and experience commensurate with the needs of the specified examinations. NDE supervisors/ examiners shall be qualified at level II or above of ASME BPV Code Section V.

13.3.The CONTRACTOR shall make available to the PURCHASER copies of certificates of qualification of the examiners he proposes to use for the PURCHASER's approval.

14. METHODS OF EXAMINATION

The methods of examination used, Ultrasonic (UT), Radiographic (RT), MT and PT shall be in accordance with ASME BPV Code, Section V.

15. ACCEPTANCE STANDARDS

15.1.Levels of acceptance of defects in welds shall be in accordance with ASME BPV Code Section VIII Division 1.

15.2.For equipment under the purview of IBR, the levels of acceptable defects shall be as per IBR.

16. REPAIR WELDING

16.1. All defects in welds requiring repair shall be removed by flame or arc gouging, grinding, chipping or machining. The major repairs may involve:

a) Cutting through the weld
b) Cutting out a portion of material containing the weld, or
c) Removing the weld metal down to the root depending upon the magnitude of the defects.

16.2.After removing the defect, the repaired portion and adjacent area shall be examined by the same NDE methods as specified for the original weld and the same acceptance criteria shall hold good.

16.3.All the repair welds shall be made using the same or other specified welding procedures as those used in making the original welds including preheating and stress relieving if originally required.

TABLE 1

WELDING SPECIFICATION CHART FOR COMMONLY USED MATERIAL

Sl.no.	Base Material	Welding process		`Filler material	
		Root	Filler	Root	Filler
1.0	CARBON STEELS	GTAW	GTAW	ER70S2 OR ER70S3	ER70S2 OR ER70S3
1.1	≤ 5MM THICK				
1.2	>5MM AND <19MM THICK	GTAW OR SMAW	GTAW OR SMAW	ER70S2 OR ER70S3 OR E6010	E6013 F6-EL8 OR E7018 F7-EL12
1.3	>19MM THICK	GTAW OR SMAW	GTAW OR SMAW	ER70S2 OR ER70S3 OR E6010	E7018 F7-EL12
2.0	LOW ALLOY STEELS	GTAW	GTAW	ER 80S B2	ER 80S B2
2.1	1 ¼ % Cr ½ Mo ≤ 5mm Thick				
2.2	1 ¼ % Cr ½ Mo > 5mm Thick	GTAW	SMAW	ER 80S B2	E 8016 OR E8018-B2
2.3	2 ¼ % Cr 1% Mo >5mm Thick	GTAW	GTAW	ER 90S B3	ER 90S B3
2.4	2 ¼ Cr 1%Mo >5mm thick	GTAW	SMAW	ER 90S B3	E 9015 OR E9016 OR E9018-B3

Note:

1) Low hydrogen electrodes shall be used for critical systems such as chlorine, hydrogen, caustic and similar toxic inflammable fluids and also whenever the wall thickness exceeds 19mm
2) The argon shielding gas flow rate shall not be less than 0.34 M3/Hr
3) For purging and shielding argon gas shall be used. However, nitrogen may be used as an alternative to argon for purging purpose only.
4) For fillet welds SMAW may be used instead of GTAW for thickness above 5mm.
5) For GTAW electrode shall be 2% thoriated tungsten.
6) Initial purging prior to welding proves shall be minimum of five times the volume between dams ot ten minutes minimum whichever is higher. When welding commences the purge gas flow shall ensure that gas pressure is only marginally higher than atmospheric pressure to ensure no root concavity.
7) Back purging using argon/nitrogen shall be maintained for the root run and minimum of one additional pass.
8) Electrodes and filler wires manufactured by reputed firms duly approved by the PURCHASER shall only be used.
9) Electrodes shall have at least the same or higher physical properties and similar chemical composition to the members only be used.

TABLE-2

PREHEAT REQUIREMENTS

SR.NO.	BASE MATERIAL	NOMINAL WALL THICKNESS MM	SPECIFIED MINIMUM TENSILE STRENGTH MPa	RECOMMENDED MINIMUM PRE-HEAT TEMPERATURE C
1	CARBON STEEL	< 25	490	10
2	CARBON STEEL	>25	490	100
3	LOW ALLOY STEEL **1 ¼ % Cr ½ %Mo**	All	All	149
4	LOW ALLOY STEEL **2 ¼ % Cr 1% Mo**	All	All	210

TABLE-3

POSTWELD HEAT TREATMENT REQUIREMENTS FOR COMMONLY USED STEEM MATERIALS

Sr.no.	**Base Material**	NOMINAL WALL THICKNESS MM	METAL TEMPERATURE RANGE ^{O}C
1	CARBON STEEL	< 32	**NONE**
2	CARBON STEEL	>32	**600 TO 650**
3	**LOW CARBON STEEL 1 ¼ % Cr ½ %Mo**	**ALL**	**600 TO 650**
4	**LOW ALLOY STEEL 2 ¼ % Cr 1% Mo**	**ALL**	**680 TO 700**

Notes:

1) In IBR systems, in carbon steels, PWHT is also required, when the carbon percentage exceeds 0.25%, at the temperature range of 600 +/- 20 ^{o}C

2) For equipment in carbon steels or alloy steels and meant for lethal service, PWHT of all welds shall be carried out.

PAINTING SPECIFICATION

All the shop-fabricated items shall be sand blasted, primer painted and then transported to site for erection. The site fabrication items also shall be sandblasted and primer painted before erection. After completion of the erection, all the damaged primer painted area shall be rectified. After primer painting, the total surface shall be final painted with sufficient number of coats using air-drying silicone aluminum paint which will be suitable to withstand 600 ^{o}C, having a DFT of 40 microns.

1.0 Preparation of surfaces

All surfaces to be painted shall be clean, dry and free from oil, grease, dirt, dust, corrosion and weld spatters. Any other surface contaminant except tightly bonded residues of mill scale rust is permissible to a limit of not more than 5% of whole surface and a maximum of 10% on any particular square inch area. Surfaces that may become inaccessible after erection or installation or both, shall be prepared and painted while still accessible as per the same procedure mentioned.

2.0 Sand Blasting/ Grit blasting

The entire surface of all the fabricated materials is to be sand/grit blasted as per near white quality of steel structures painting council (SSPC) standard of SA 2.5 of SIS 055900. The surface profile after blasting shall be between 37-65 microns and should be of jagged in nature. Hand cleaning shall be carried out by chipping and scraping followed by wire brushing/abrasive wheels for items for which surface preparation is difficult by sand blasting after taking approval from purchaser / TPIA. All surfaces shall be degreased using a suitable solvent to remove oil and grease and shall be dried off before painting.

3.0 Painting scheme

Immediately after sand blasting, one coat of inorganic zinc silicate primer shall be applied to a dry film thickness (DFT) of 65 microns (minimum). The second coat of same primer paint shall be applied after completion of final assembly and welding works on total MLS surface at site. The Final coat of 40 microns of air drying silicone aluminium paint suitable to withstand 600 ^{o}C temperature shall be applied.

All paint and primer shall be of standard quality and procured from approved manufacturers as prescribed in the list furnished. The tenderer shall provide the purchaser “Elcometer” / Paint thickness measuring gauges free of charge and shall measure the thickness of paint in the presence of the representative of the purchaser at random locations selected by him.

Machine finished surfaces shall be protected against corrosion by a rust inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

Second primer coating and final HR painting shall only be done after the structure is erected, leveled, plumbed, aligned and welded/connected in its final position, tested and commissioned. However, touch up painting, making

good to any damaged shop painting and completing any unfinished portion of the shop coat shall be carried out by the Tenderer free of cost. The materials and specification for such painting in the field shall be in accordance with the requirements of the specification for shop painting.

Painting shall not be done in frosty or foggy weather or when humidity is such as to cause condensation on the surfaces to be painted. Before painting of steel, which is delivered unpainted, is commenced, all surfaces to be painted shall be dried and thoroughly cleaned from all loose scale and rust.

All field rivets, bolts, welds and abrasions to the shop coat shall be spot painted with the same paint used for the shop coat. Where specified, surfaces which will be in contact after site assembling shall receive a coat of paint (in addition to the shop coat, if any) and shall be brought together while the paint is still wet.

Bolts and fabricated steel members, which are galvanized or otherwise treated, shall not be painted before completion of final assembly.

Paints shall be stored under cover in airtight containers. Paints supplied in sealed containers shall be used up as soon as possible once the container is opened.

While painting the new structures, the already finished floors and structures shall not be spoilt. If there is any spillage of paint on the floors or members on the finished structures, the tenderer has to clear and provide the painting to the spoiled areas.

Paints supply shall be checked for shelf life to meet the requirements before application. Proper action shall be taken well in advance prior to actual usage.

4.0 Paint specifications:

(a) Inorganic Zinc Silicate Primer:

- Two part, self-cured
- Dry temperature resistance to 400 ^{o}C
- Minimum shelf life of 12 months
- Excellent abrasion resistance
- Minimum coverage of 9 sq./litre at 65 microns (minimum)
- Volume of solids 60% (minimum) by weight and 80% of zinc in dry film by weight
- No mud cracking at an applied thickness of 75 microns.

(b) Air drying silicone aluminum paint

- Temperature resistance up to 600 Deg C continuous
- Single component, Self-cured
- Resin base: Silicon
- Volume of solids 25% (minimum)
- Excellent adhesion by cross hatch test
- Minimum shelf life 12 months.

QUALITY ASSURANCE PLAN (QAP) FOR MLS

QUALITY ASSURANCE PLAN FOR MLS

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
A.	MATERIAL (RAW MATERIALS & BOUGHTOUTS)											
1	Rolled plates & sections	a. Appearance	Visual	Major	100%	IS:2062	Freedom from defects like pitting, cracks, etc.	--	H	H	R	
		b. Properties	Chemical analysis & physical test	Major	100%	IS:2062	Drawing specification	Mill test certificates/ Lab reports	H	R	R	
		c. Internal flaws	UT	Critical	100% for plates ≥20mm thick, 10% for sections ≥250mm	ASTM A435	Specification	NDT reports	H	H	R	
2	Fasteners (high tensile bolts & nuts etc.)	a. Quality	Visual	Major	Sample check as per relevant specification	IS:1367	a. No cracks b. Proper matching with nuts	IR	H	W	R	
		b. Chemical composition & physical properties	Chemical analysis, mechanical test	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III	Manufac-turer's test certificates	H	R	R	
		c. Dimensional	Measure-ments	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III & XIII		H	W	R	

Legend :
VR – Vendor
IS – ISRO
TP – Third Party Inspection Agency
H – Carrying out responsibility
R – Review of records & results
W – Test/inspection to be witnessed

Signature
1.
2.
For VENDOR

Signature
1.
2.
For THIRD PARTY

Signature
1.
2.
For ISRO

Date :

Place :

QUALITY ASSURANCE PLAN FOR MLS

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
B.	WELDING PROCEDURE, WELDER'S QUALIFICATION, ETC.											
1	Welding	WPS, Welder's & Welding operator's qualification	Test piece, Visual, Physical & NDT (RT)	Critical	100%	ASME Sec IX	ASME Sec IX	WPS, PQR & WPQ	H	W	R	
C.	FABRICATION (MODULES OF MLS, ANCHOR LEG. ETC.)											
1	Setting out / Layoout / Marking / CNC programming	Layout	Measurement	Major	100%	Relevant drawings	Full scale layout to be checked before cutting	Shop register	H	W	R	
2	Fitup before welding	Quality	Visual alignment & check of major dimensions	Major	100%	Drawings	a. proper edge preparation b. proper tack welds c. minimum gap for butt joints as per WPS d. DIN-8570	IR	H	H	R	Members requiring site welding shall be match marked at joining ends for site erection
3	Welding (fillet joints)	Profile, fillet size, overall physical appearance	Visual/ gauge, DP/ MPT after final welding	Major	100%	ASME SecVIII, Vol-1	Drawings	IR	H	W	R	100% DP test shall be done

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1.	1.	1.	
2.	2.	2.	
For VENDOR	For THIRD PARTY	For ISRO	Place :

QUALITY ASSURANCE PLAN FOR MLS

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
4	Full penetration welding	a. Root inspection after back gouging	Visual & LPI	Major	100%	IS:3658	No cracks allowed	IR	H	W	R	100% DP test shall be done
		b. Internal defects	UT / RT	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	W	R	
		c. Welding quality, surface defects	LPI / MPI	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	H	R	
5	Stress relieving (after complete welding)	T-T curves	T-T curve verification	Major	100%	ASME Sec-VIII, Vol-I	Drawings	T-T graph	H	R	R	
6	Dimensional inspection after welding & stress relieving	Dimensional	Measurement of major dimensions & full size shop layout checking	Major	100%	Drawing / DIN 8570	Drawings	IR	H	H	W	
D. GRIT BLASTING & PAINTING												
1	Grit blasting & painting	Paint thickness	Visual & measurement by paint thickness gauge	Major	At random for paint thickness	Drawing & specification	Drawings & specification	IR	H	W	R	

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									VR	TP	IS	
E. MACHINING (MODULES OF MLP, ANCHOR LEG)												
1	Machining	Overall dimensions	Measurement & visual	Major	100%	Drawing	Drawing	IR	H	H	R	
2	Drilling, etc.	Drilling & tapping	Measurement of hole size & center distances	Critical	100%	Drawing & DIN 8570	Drawing	IR	H	H	R	
F. ASSEMBLY OF MODULES OF MLP, ANCHOR LEGS AND OTHER SUB-ASSEMBLIES AT SHOP												
1	Control assembly at works	Dimensions, level, alignment, erection of clits with fasteners	Visual & measurement	Critical	100%	Drawing	Drawings	IR	H	H	H	Before dismantling, reference line& match marking to be punched. Welding of erection clits to be ensured.

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									VR	TP	IS	
G. ERECTION AT SITE												
1	Fabricated material inspection	Visual, dimensional, review of TC & IR	Visual & measurement	Major	100%	TS & approved drawings	TS & approved drawings	IR	H	R	R	
2	Welding & welder qualification	WPS, Welder's & Welding operator's qualification	Test piece, Visual, Physical & NDT (RT)	Critical	100%	ASME Sec IX	ASME Sec IX	WPS, PQR & WPQ	H	W	R	
3	Positioning & alignment of anchor legs, Modules	Position, level, span, diagonal, height and other dimensions	Measurement & visual	Major	100%	Drawing	Drawing	IR	H	H	H	
4	Welding	Preheat / interpass / sequence of welding	Visual	Major	100%	Drawing & TS	Drawing & TS	IR	H	H	H	
5	Stress relieving	T-T curves	T-T curves, charts	Critical	100%	Drawing & TS	Drawings & TS	IR	H	H	H	
6	Complete welding	Visual, DPT, UT	Visual & UT	Major	100%	TS & drawings	TS & drawings	IR	H	H	H	
7	Dimensional check of whole assembly	Position, level, span, diagonal, height and all dimensions	Measurement & Visual	Major	100%	Drawings	Drawings	IR	H	H	H	
10	Assembly of MLS with bogie	Interfaces & Clearances	Visual & measurement	Major	100%	TS & drawings	TS & drawings	IR	H	H	H	
11	MLS movement with bogie	Clearances	Visual & measurement	Major	100%	TS & drawings	TS & drawings	IR	H	H	H	

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BILL OF MATERIALS

DETAILS OF FABRICATED COMPONENTS

Material Quantities mentioned in the following Table is for different plate thickness for MOBILE LAUNCH STRUCTURE (MLS) which includes(MLP) & UMBILICAL TOWER (UT)

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
1.0	MLP for MLS	1						**10-STR-12-1-23/A1 Sheet 3 of 12**
1.1	**Details of section S2-S2**	1	PLATE 9000X1380X12Thk	1	Mild Steel E 250-BR; IS:2062	170	5432	-do-
1.2		1	PLATE 7800X1380X12Thk	2	Mild Steel E 250-BR; IS:2062	1017		-do-
1.3		10	PLATE 700X650X12Thk	3	Mild Steel E 250-BR; IS:2062	429		-do-
1.4		10	PLATE 688X650X12Thk	4	Mild Steel E 250-BR; IS:2062	421		-do-
1.5		10	PLATE 672X650X16Thk	5	Mild Steel E 250-BR; IS:2062	549		-do-
1.6		10	PLATE 588X650X16Thk	6	Mild Steel E 250-BR; IS:2062	480		-do-
1.7		20	PLATE 594X650X12Thk	7	Mild Steel E 250-BR; IS:2062	727		-do-
1.8		8	PLATE 564X650X12Thk	8	Mild Steel E 250-BR; IS:2062	276		-do-
1.9		2	PLATE 2988X650X12Thk	9	Mild Steel E 250-BR; IS:2062	365		-do-
1.10	**Details of section S3-S3**	2	PLATE 7800X700X12Thk	10	Mild Steel E 250-BR; IS:2062		2982	-do-
1.11	-do-	2	PLATE 2988X700X12Thk	11	Mild Steel E 250-BR; IS:2062	394		-do-
1.12	-do-	11	PLATE 700X588X12Thk	12	Mild Steel E 250-BR; IS:2062	426		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
1.13	-do-	11	PLATE 700X576X12Thk	13	Mild Steel E 250-B; IS:2062	418		
1.14	-do-	6	PLATE 700X563X12Thk	14	Mild Steel E 250-BR; IS:2062	223		-do-
1.15	**Details of section S4-S4 (MLP side view cross section)**	9	PLATE 2000X578X12Thk	15	Mild Steel E 250-BR; IS:2062	980	6639	-do-
1.16	-do-	4	PLATE 699X578X12Thk	16	Mild Steel E 250-BR; IS:2062	152		-do-
1.17	-do-	4	PLATE 688X578X12Thk	17	Mild Steel E 250-BR; IS:2062	150		-do-
1.18	-do-	4	PLATE 671X578X12Thk	18	Mild Steel E 250-BR; IS:2062	146		-do-
1.19	-do-	4	PLATE 587X578X12Thk	19	Mild Steel E 250-BR; IS:2062	172		-do-
1.20	**Details of section S1-S1 (MLP Front elevation cross section)**	24	PLATE 700X588X12Thk	20	Mild Steel E 250-BR; IS:2062	931		-do-
1.21	-do-	48	PLATE 700X578X12Thk	21	Mild Steel E 250-BR; IS:2062	1829		-do-
1.22	-do-	48	PLATE 700X572X12Thk	22	Mild Steel E 250-BR; IS:2062	1810		-do-
1.23	-do-	2	PLATE 2000X578X14Thk	29	Mild Steel E 250-BR; IS:2062	254		-do-
1.24	-do-	4	PLATE 600X578X12Thk	30	Mild Steel E 250-BR; IS:2062	131		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
2.0	**Details of section S8-S8 (Internal cross section of the MLP)**	1					49272	**10-STR-12-1-23/A1 Sheet 4 of 12**
2.1	-do-	50	PLATE 2000X578X12Thk	1	Mild Steel E 250-BR; IS:2062	5445		-do-
2.2	-do-	11	PLATE 2000X588X12Thk	2	Mild Steel E 250-BR; IS:2062	1219		-do-
2.3	-do-	2	PLATE 2000X2400X12Thk	3	Mild Steel E 250-BR; IS:2062	904		-do-
2.4	-do-	4	PLATE 2000X600X25Thk	4	Mild Steel E 250-BR; IS:2062	942		-do-
2.5	-do-	4	PLATE 2000X550X25Thk	5	Mild Steel E 250-BR; IS:2062	864		-do-
2.6	-do-	2	PLATE 2000X2400X25Thk	6	Mild Steel E 250-BR; IS:2062	1884		-do-
2.7	-do-	3	PLATE 7800X2000X12Thk	7	Mild Steel E 250-BR; IS:2062	4409		-do-
2.8	-do-	4	PLATE 3300X2000X12Thk	8	Mild Steel E 250-BR; IS:2062	2487		-do-
2.9	-do-	6	PLATE 2000X563X12Thk	9	Mild Steel E 250-BR; IS:2062	636		-do-
2.10	-do-	10	PLATE 2000X824X12Thk	10	Mild Steel E 250-BR; IS:2062	1552		-do-
2.11	-do-	12	PLATE 2000X808X12Thk	11	Mild Steel E 250-BR; IS:2062	1827		-do-
2.12	-do-	2	PLATE 2000X7800X10Thk	12	Mild Steel E 250-BR; IS:2062	2449		-do-
2.13	-do-	4	PLATE 2000X3450X10Thk	13	Mild Steel E 250-BR; IS:2062	2167		-do-
2.14	-do-	4	PLATE 2000X578X16Thk	14	Mild Steel E 250-BR; IS:2062	580		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
2.15	-do-	4	PLATE 2000X3450X12Thk	15	Mild Steel E 250-BR; IS:2062	2600		10-STR-12-1-23/A1 Sheet 4 of 12
2.16	-do-	2	PLATE 2000X5400X12Thk	16	Mild Steel E 250-BR; IS:2062	2035		-do-
2.17	-do-	2	PLATE 2000X5376X12Thk	17	Mild Steel E 250-BR; IS:2062	2026		-do-
2.18	-do-	2	PLATE 2000X4232X16Thk	18	Mild Steel E 250-BR; IS:2062	2126		-do-
2.19	-do-	2	PLATE 2000X4200X16Thk	19	Mild Steel E 250-BR; IS:2062	2110		-do-
2.20	-do-	24	PLATE 2000X572X10Thk	20	Mild Steel E 250-BR; IS:2062	2155		-do-
2.21	-do-	4	PLATE 2000X572X12Thk	21	Mild Steel E 250-BR; IS:2062	431		-do-
2.22	-do-	8	PLATE 2000X845X12Thk	22	Mild Steel E 250-BR; IS:2062	1274		-do-
2.23	-do-	8	PLATE 2000X830X12Thk	23	Mild Steel E 250-BR; IS:2062	1251		-do-
2.24	-do-	4	PLATE 2000X810X12Thk	24	Mild Steel E 250-BR; IS:2062	610		-do-
2.25	-do-	4	PLATE 2000X250X20Thk	25	Mild Steel E 250-BR; IS:2062	314		-do-
2.26	-do-	8	PLATE 2000X420X20Thk	26	Mild Steel E 250-BR; IS:2062	1055		-do-
2.27	-do-	8	PLATE 2000X697X20Thk	27	Mild Steel E 250-BR; IS:2062	1751		-do-
2.28	-do-	4	PLATE 2000X1110X20Thk	28	Mild Steel E 250-BR; IS:2062	1394		-do-
2.29	-do-	1	PLATE 6685X600X10Thk	29	Mild Steel E 250-BR; IS:2062	315		-do-
2.30	-do-	2	PLATE 4885X600X10Thk	30	Mild Steel E 250-BR; IS:2062	460		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
3.0	**Details of section S5-S5 & S6-S6 (side view cross section of the MLP)**						15043	10-STR-12-1-23/A1 Sheet **5** of 12
3.1	-do-	11	PLATE 700X676X12Thk	1	Mild Steel E 250-BR; IS:2062	490		-do-
3.2	-do-	3	PLATE 3576X650X12Thk	2	Mild Steel E 250-BR; IS:2062	1970		-do-
3.3	-do-	1	PLATE 9000X3000X25Thk	3	Mild Steel E 250-BR; IS:2062	5298		-do-
3.4	-do-	1	PLATE 8375X2988X25Thk	4	Mild Steel E 250-BR; IS:2062	4911		-do-
3.5	-do-	3	PLATE 8375X676X12Thk	5	Mild Steel E 250-BR; IS:2062	1600		-do-
3.6	-do-	8	STIFFNER 300X250X40Thk	6	Mild Steel E 250-BR; IS:2062	188		-do-
3.7	-do-	2	PLATE 3576X650X16Thk	7	Mild Steel E 250-BR; IS:2062	583		
4.0	**Details of section S7-S7 (MLP bottom deck cross section)**						63897	10-STR-12-1-23/A1 Sheet **6** of 12
4.1	-do-	12	PLATE 665X600X12Thk	1	Mild Steel E 250-BR; IS:2062	457		-do-
4.2	-do-	37	PLATE 665X588X12Thk	2	Mild Steel E 250-BR; IS:2062	1362		-do-
4.3	-do-	43	PLATE 665X578X12Thk	3	Mild Steel E 250-BR; IS:2062	1556		-do-
4.4	-do-	28	PLATE 665X595X12Thk	4	Mild Steel E 250-BR; IS:2062	1043		-do-
4.5	-do-	40	PLATE 665X595X10Thk	5	Mild Steel E 250-BR; IS:2062	1242		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
4.6	-do-	4	PLATE 5376X665X10Thk	6	Mild Steel E 250-BR; IS:2062	1123		10-STR-12-1-23/A1 Sheet **6** of 12
4.7	-do-	2	PLATE 7800X665X12Thk	7	Mild Steel E 250-BR; IS:2062	977		-do-
4.8	-do-	2	PLATE 2400X665X25Thk	8	Mild Steel E 250-BR; IS:2062	626		-do-
4.9	-do-	4	PLATE 665X600X25Thk	9	Mild Steel E 250-BR; IS:2062	313		-do-
4.10	-do-	4	PLATE 665X550X25Thk	9a	Mild Steel E 250-BR; IS:2062	287		-do-
4.11	-do-	2	PLATE 1200X665X10Thk	10	Mild Steel E 250-BR; IS:2062	250		-do-
4.12	-do-	2	PLATE 5376X665X12Thk	11	Mild Steel E 250-BR; IS:2062	**674**		-do-
4.13	-do-	21	PLATE 665X572X10Thk	12	Mild Steel E 250-BR; IS:2062	627		-do-
4.14	-do-	2	PLATE 4232X665X16Thk	13	Mild Steel E 250-BR; IS:2062	707		-do-
4.15	-do-	2	PLATE 4200X665X16Thk	14	Mild Steel E 250-BR; IS:2062	702		-do-
4.16	-do-	4	PLATE 1110X665X20Thk	15	Mild Steel E 250-BR; IS:2062	464		-do-
4.17	-do-	8	PLATE 697X665X20Thk	16	Mild Steel E 250-BR; IS:2062	582		-do-
4.18	-do-	8	PLATE 665X420X20Thk	17	Mild Steel E 250-BR; IS:2062	351		-do-
4.19	-do-	1	PLATE 7800X665X12Thk	18	Mild Steel E 250-BR; IS:2062	489		-do-
4.20	-do-	4	PLATE 7800X665X10Thk	19	Mild Steel E 250-BR; IS:2062	1629		-do-
4.21	-do-	2	PLATE 8976X665X12Thk	20	Mild Steel E 250-BR; IS:2062	1125		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
4.22	-do-	2	PLATE 665X578X14Thk	21	Mild Steel E 250-BR; IS:2062	97		10-STR-12-1-23/A1 Sheet **6** of 12
4.23	-do-	2	PLATE 8950X665X12Thk	22	Mild Steel E 250-BR; IS:2062	1121		-do-
4.24	-do-	1	PLATE 7800X665X12Thk	23	Mild Steel E 250-BR; IS:2062	489		-do-
4.25	-do-	8	PLATE 845X665X12Thk	24	Mild Steel E 250-BR; IS:2062	423		-do-
4.26	-do-	24	PLATE 810X665X12Thk	25	Mild Steel E 250-BR; IS:2062	1218		-do-
4.27	-do-	8	PLATE 766X665X12Thk	26	Mild Steel E 250-BR; IS:2062	384		-do-
4.28	-do-	8	PLATE 828X665X12Thk	27	Mild Steel E 250-BR; IS:2062	415		-do-
4.29	-do-	8	PLATE 773X665X12Thk	28	Mild Steel E 250-BR; IS:2062	387		-do-
4.30	-do-	16	PLATE 822X665X12Thk	29	Mild Steel E 250-BR; IS:2062	824		-do-
4.31	-do-	12	PLATE 835X665X12Thk	30	Mild Steel E 250-BR; IS:2062	628		-do-
4.32	-do-	1	TOP PLATE 12000X9000X10Thk	31	Mild Steel E 250-BR; IS:2062	8478		-do-
4.33	-do-	1	BOTTOM PLATE 12000X9000X25Thk	32	Mild Steel E 250-BR; IS:2062	21195		-do-
4.34	-do-	4	PLATE 1350X1350X80Thk	33	Mild Steel E 250-BR; IS:2062	4578		-do-
4.35	-do-	4	PLATE 665X250X25Thk	34	Mild Steel E 250-BR; IS:2062	131		-do-
4.36	-do-	6	PLATE 665X592X20Thk	35	Mild Steel E 250-BR; IS:2062	371		-do-
4.37	-do-	6	PLATE 665X588X20Thk	36	Mild Steel E 250-BR; IS:2062	368		-do-

4.38	-do-	6	PLATE 665X588X20Thk	37	Mild Steel E 250-BR; IS:2062	363		-do-
4.39	-do-	8	PLATE 2375X665X20Thk	38	Mild Steel E 250-BR; IS:2062	1984		-do-
4.40	-do-	4	PLATE 1800X665X20Thk	39	Mild Steel E 250-BR; IS:2062	752		-do-
4.41	-do-	2	PLATE 2388X665X12Thk	40	Mild Steel E 250-BR; IS:2062	299		-do-
4.42	-do-	3	PLATE 4120x665x12Thk	41	Mild Steel E 250-BR; IS:2062	774		-do-
4.43	-do-	2	PLATE 2375X665X16Thk	42	Mild Steel E 250-BR; IS:2062	397		-do-
4.44	-do-	6	PLATE 665X594X20Thk	43	Mild Steel E 250-BR; IS:2062	372		-do-
4.45	-do-	6	PLATE 665X586X20Thk	44	Mild Steel E 250-BR; IS:2062	367		-do-
4.46	-do-	10	PLATE 665X578X20Thk	45	Mild Steel E 250-BR; IS:2062	603		-do-
4.47	-do-	2	PLATE 2375X665X12Thk	46	Mild Steel E 250-BR; IS:2062	298		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
5.0	**Details of MLP TOP DECK section S9-S9**						55239	10-STR-12-1-23/A1 Sheet **7** of 12
5.1	-do-	2	PLATE 1800X665X12Thk	1	Mild Steel E 250-BR; IS:2062	226		-do-
5.2	-do-	39	PLATE 665X588X12Thk	2	Mild Steel E 250-BR; IS:2062	1437		-do-
5.3	-do-	51	PLATE 665X578X12Thk	3	Mild Steel E 250-BR; IS:2062	1847		-do-
5.4	-do-	30	PLATE 665X595X12Thk	4	Mild Steel E 250-BR; IS:2062	1118		-do-
5.5	-do-	41	PLATE 665X595X10Thk	5	Mild Steel E 250-BR; IS:2062	1273		-do-
5.6	-do-	4	PLATE 5376X665X10Thk	6	Mild Steel E 250-BR; IS:2062	1123		-do-
5.7	-do-	2	PLATE 7800X665X12Thk	7	Mild Steel E 250-BR; IS:2062	977		-do-
5.8	-do-	2	PLATE 2400X665X25Thk	8	Mild Steel E 250-BR; IS:2062	626		-do-
5.9	-do-	4	PLATE 665X600X25Thk	9	Mild Steel E 250-BR; IS:2062	313		-do-
5.10	-do-	4	PLATE 665X550X25Thk	9a	Mild Steel E 250-BR; IS:2062	287		-do-
5.11	-do-	2	PLATE 1200X665X10Thk	10	Mild Steel E 250-BR; IS:2062	125		-do-
5.12	-do-	2	PLATE 5376X665X12Thk	11	Mild Steel E 250-BR; IS:2062	674		-do-
5.13	-do-	23	PLATE 665X572X10Thk	12	Mild Steel E 250-BR; IS:2062	687		-do-
5.14	-do-	2	PLATE 4232X665X16Thk	13	Mild Steel E 250-BR; IS:2062	707		-do-
5.15	-do-	2	PLATE 4200X665X16Thk	14	Mild Steel E 250-BR; IS:2062	702		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
5.16	**Details of MLP TOP DECK section S9-S9**	8	PLATE 1110X665X20Thk	15	Mild Steel E 250-BR; IS:2062	464		10-STR-12-1-23/A1 Sheet **7** of 12
5.17	-do-	8	PLATE 697X665X20Thk	16	Mild Steel E 250-BR; IS:2062	582		-do-
5.18	-do-	8	PLATE 665X420X20Thk	17	Mild Steel E 250-BR; IS:2062	351		-do-
5.19	-do-	1	PLATE 7800X665X12Thk	18	Mild Steel E 250-BR; IS:2062	489		-do-
5.20	-do-	4	PLATE 7800X665X10Thk	19	Mild Steel E 250-BR; IS:2062	1629		-do-
5.21	-do-	2	PLATE 8976X665X12Thk	20	Mild Steel E 250-BR; IS:2062	1125		-do-
5.22	-do-	4	PLATE 665X578X16Thk	21	Mild Steel E 250-BR; IS:2062	193		-do-
5.23	-do-	2	PLATE 8950X665X12Thk	22	Mild Steel E 250-BR; IS:2062	1121		-do-
5.24	-do-	4	PLATE 3420X665X12Thk	23	Mild Steel E 250-BR; IS:2062	857		-do-
5.25	-do-	8	PLATE 845X665X12Thk	24	Mild Steel E 250-BR; IS:2062	423		-do-
5.26	-do-	24	PLATE 810X665X12Thk	25	Mild Steel E 250-BR; IS:2062	1218		-do-
5.27	-do-	8	PLATE 766X665X12Thk	26	Mild Steel E 250-BR; IS:2062	384		-do-
5.28	-do-	8	PLATE 828X665X12Thk	27	Mild Steel E 250-BR; IS:2062	415		-do-
5.29	-do-	8	PLATE 773X665X12Thk	28	Mild Steel E 250-BR; IS:2062	387		-do-
5.30	-do-	16	PLATE 822X665X12Thk	29	Mild Steel E 250-BR; IS:2062	824		-do-
5.31	-do-	12	PLATE 835X665X12Thk	30	Mild Steel E 250-BR; IS:2062	628		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
5.32	**Details of MLP TOP DECK section S9-S9**	1	BOTTOM PLATE 9000X8990X25Thk	31	Mild Steel E 250-BR; IS:2062	15879		10-STR-12-1-23/A1 Sheet **7** of 12
5.33	-do-	1	TOP PLATE 9000X8990X25Thk	32	Mild Steel E 250-BR; IS:2062	15879		-do-
5.34	-do-	4	PLATE 665X250X25Thk	33	Mild Steel E 250-BR; IS:2062	131		-do-
5.35	-do-	4	PLATE 665X563X12Thk	34	Mild Steel E 250-BR; IS:2062	141		-do-
6.0	**Details of MLP central Annular Structure (CAS)**						30961	10-STR-12-1-23/A1 Sheet **8** of 12
6.1	-do-	1	PLATE OD3200XID2800X30THK	1	Mild Steel E 250-BR; IS:2062	444		-do-
6.2	-do-	1	SHELL OD2850XID2800X4500Height	2	Mild Steel E 250-BR; IS:2062	7839		-do-
6.3	-do-	6	Circular plate OD3700XID2850X32Thk	3	Mild Steel E 250-BR; IS:2062	6591		-do-
6.4	-do-	2	SHELL OD3700XID3650X685Height	4	Mild Steel E 250-BR; IS:2062	3105		-do-
6.5	-do-	1	SHELL OD3700XID3650X750Height	5	Mild Steel E 250-BR; IS:2062	1700		-do-
6.6	-do-	1	SHELL OD3700XID3650X720Height	6	Mild Steel E 250-BR; IS:2062	1632		-do-
6.7	-do-	1	SHELL OD3700XID3650X368Height	7	Mild Steel E 250-BR; IS:2062	834		-do-
6.8	-do-	1	SHELL OD3700XID3650X1100Height	8	Mild Steel E 250-BR; IS:2062	2284		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
6.9	Details of MLP central Annular Structure (CAS)	1	SHELL OD3530XID2850X25Thk	9	Mild Steel E 250-BR; IS:2062	669		10-STR-12-1-23/A1 Sheet **8** of 12
6.10	-do-	1	SHELL OD3273XID2850X25Thk	10	Mild Steel E 250-BR; IS:2062	399		-do-
6.11	-do-	16	STIFFNER 685X400X50Thk	11	Mild Steel E 250-BR; IS:2062	1721		-do-
6.12	-do-	8	STIFFNER 750X400X50Thk	12	Mild Steel E 250-BR; IS:2062	942		-do-
6.13	-do-	8	STIFFNER 720X400X50Thk	13	Mild Steel E 250-BR; IS:2062	904		-do-
6.14	-do-	8	STIFFNER 368X400X50Thk	14	Mild Steel E 250-BR; IS:2062	462		-do-
6.15	-do-	8	STIFFNER 305X400X50Thk	15	Mild Steel E 250-BR; IS:2062	383		-do-
6.16	-do-	8	STIFFNER 440X400X50Thk	16	Mild Steel E 250-BR; IS:2062	553		-do-
6.17	-do-	8	STIFFNER 305X400X50Thk	17	Mild Steel E 250-BR; IS:2062	383		-do-
6.18	-do-	72	STIFFNER 155X55X25Thk	18	Mild Steel E 250-BR; IS:2062	117		-do-
7.0	**Details of MLP Leg and Column**						15933	**10-STR-12-1-23/A1 Sheet 9 of 12**
7.1	-do-	8	PLATE 1430X600X40Thk	1	Mild Steel E 250-BR; IS:2062	2155		-do-
7.2	-do-	8	PLATE 1430X520X40Thk	2	Mild Steel E 250-BR; IS:2062	1868		-do-
7.3	-do-	20	PLATE 520X520X20Thk	3	Mild Steel E 250-BR; IS:2062	849		-do-
7.4	-do-	4	PLATE 600X566X40Thk	4	Mild Steel E 250-BR; IS:2062	427		-do-
7.5	-do-	4	PLATE 550X550X12Thk	5	Mild Steel E 250-BR; IS:2062	370		-do-
7.6	-do-	20	PLATE 550X550X12Thk	6	Mild Steel E 250-BR; IS:2062	570		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
7.7	-do-	4	PLATE 4780X600X25Thk	7	Mild Steel E 250-BR; IS:2062	2251		-do-
7.8	-do-	4	PLATE 4780X550X25Thk	8	Mild Steel E 250-BR; IS:2062	2064		-do-
7.9	-do-	8	PLATE 820X820X32Thk	9	Mild Steel E 250-BR; IS:2062	1351		-do-
7.10	-do-	4	PLATE 3380X600X25Thk	10	Mild Steel E 250-BR; IS:2062	1592		-do-
7.11	-do-	4	PLATE 3380X550X25Thk	11	Mild Steel E 250-BR; IS:2062	1459		-do-
7.12	-do-	4	PLATE 820X820X40Thk	12	Mild Steel E 250-BR; IS:2062	845		-do-
7.13	-do-	48	STIFFNER 200X110X16Thk	13	Mild Steel E 250-BR; IS:2062	133		-do-
7.14	-do-	64 sets	M39 Hex. Bolt and Nut with Two Washers- 120 Lg	14	AS PER IS 1364	-		-do-
8.0	**Details of Umbilical Tower Assembly for MLS**						44881	**10-STR-12-1-23/A1 Sheet 10 of 12**
8.1	-do-	4	BASE PLATE 550X350X25Thk	1	Mild Steel E 250-BR; IS:2062	155		-do-
8.2	-do-	8	PLATE 7730X400X20Thk	2	Mild Steel E 250-BR; IS:2062	3884		-do-
8.3	-do-	8	PLATE 8000X160X20Thk	3	Mild Steel E 250-BR; IS:2062	1608		-do-
8.4	-do-	10	REC. HOLLOW SECTION 300X150X6Thk- 4000Lg	4	IS:4923	1621		-do-
8.5	-do-	10	SQ. HOLLOW SECTION 150X150X6Thk- 4308Lg	5	IS:4923	1137		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
8.6	-do-	20	SQ. HOLLOW SECTION 150X150X6Thk- 2154 Lg	6	IS:4923	1137		-do-
8.7	-do-	10	REC. HOLLOW SECTION 200X100X8Thk- 2600 Lg	7	IS:4923	894		-do-
8.8	-do-	10	SQ. HOLLOW SECTION 150X150X6Thk- 3053 Lg	8	IS:4923	806		-do-
8.9	-do-	20	SQ. HOLLOW SECTION 150X150X6Thk- 1526 Lg	9	IS:4923	665		-do-
8.10	-do-	8	PLATE 8075X400X20Thk	10	Mild Steel E 250-BR; IS:2062	4057		-do-
8.11	-do-	8	PLATE 8075X160X20Thk	11	Mild Steel E 250-BR; IS:2062	1623		-do-
8.12	-do-	6	REC. HOLLOW SECTION 200X100X6Thk- 3448 Lg	12	IS:4923	546		-do-
8.13	-do-	6	REC. HOLLOW SECTION 200X100X6Thk- 2898 Lg	13	IS:4923	459		-do-
8.14	-do-	6	REC. HOLLOW SECTION 200X100X6Thk- 2348 Lg	14	IS:4923	372		-do-
8.15	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 4226 Lg	15	IS:4923	144		-do-
8.16	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 3751 Lg	16	IS:4923	127		-do-
8.17	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 3299 Lg	17	IS:4923	112		-do-
8.18	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 2881 Lg	18	IS:4923	98		-do-
8.19	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 2266 Lg	19	IS:4923	154		-do-
8.20	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 2038 Lg	20	IS:4923	138		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
8.21	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1822 Lg	21	IS:4923	124		-do-
8.22	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1631 Lg	22	IS:4923	111		-do-
8.23	-do-	2	REC. HOLLOW SECTION 200X100X6Thk- 2348 Lg	23	IS:4923	124		-do-
8.24	-do-	2	REC. HOLLOW SECTION 200X100X6Thk- 2098 Lg	24	IS:4923	111		-do-
8.25	-do-	2	REC. HOLLOW SECTION 200X100X6Thk- 1848 Lg	25	IS:4923	98		-do-
8.26	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 3279 Lg	26	IS:4923	223		-do-
8.27	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 3085 Lg	27	IS:4923	210		-do-
8.28	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 2899 Lg	28	IS:4923	197		-do-
8.29	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 2723 Lg	29	IS:4923	185		-do-
8.30	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1620 Lg	30	IS:4923	110		-do-
8.31	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1531 Lg	31	IS:4923	104		-do-
8.32	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1448 Lg	32	IS:4923	98		-do-
8.33	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1373 Lg	33	IS:4923	93		-do-
8.34	-do-	8	PLATE-1: 17000X400X20Thk	34	Mild Steel E 250-BR; IS:2062	8541		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
8.35	-do-	8	PLATE-2: 17000X160X20Thk	35	Mild Steel E 250-BR; IS:2062	3416		-do-
8.36	-do-	18	REC. HOLLOW SECTION 200X100X6Thk- 1800 Lg	36	IS:4923	855		-do-
8.37	-do-	16	SQ. HOLLOW SECTION 100X100X6Thk- 2691 Lg	37	IS:4923	731		-do-
8.38	-do-	32	SQ. HOLLOW SECTION 100X100X6Thk- 1345 Lg	38	IS:4923	731		-do-
8.39	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 2059 Lg	39	IS:4923	70		-do-
8.40	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 1030 Lg	40	IS:4923	70		-do-
8.41	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 1800 Lg	41	IS:4923	61		-do-
8.42	-do-	18	REC. HOLLOW SECTION 200X100X6Thk- 1600 Lg	42	IS:4923	990		-do-
8.43	-do-	16	SQ. HOLLOW SECTION 100X100X6Thk- 2561 Lg	43	IS:4923	696		-do-
8.44	-do-	32	SQ. HOLLOW SECTION 100X100X6Thk- 1280 Lg	44	IS:4923	696		-do-
8.45	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 1889Lg	45	IS:4923	64		-do-
8.46	-do-	4	SQ. HOLLOW SECTION 100X100X6Thk- 943Lg	46	IS:4923	64		-do-
8.47	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 1600Lg	47	IS:4923	54		-do-
8.48	-do-	40	PLATE 550X350X25Thk	48	Mild Steel E 250-BR; IS:2062	1511		-do-

Sl No.	DESCRIPTION OF COMPONENT	QTY (Nos)	OVERALL DIMENSIONS (mm)	PART NO.	MATERIAL	APPROX. WEIGHT (kg)		DRAWING REFERENCE
8.49	-do-	1	PLATE-1 15730 X 4200 X 6Thk	49	Mild Steel E 250-BR; IS:2062	3112		-do-
8.50	-do-	1	PLATE-1 17000 X 2000 X 6Thk	50	Mild Steel E 250-BR; IS:2062	1601		-do-
8.51	-do-	40	STIFFNER 200X75X20Thk	53	Mild Steel E 250-BR; IS:2062	94		-do-
9.0	**Details of UT platform Levels for MLS**						2942	**10-STR-12-1-23/A1 Sheet 11 of 12**
9.1	-do-	1	SQ. HOLLOW SECTION 150X150X6Thk- 4662Lg	1	IS:4923	123		-do-
9.2	-do-	1	SQ. HOLLOW SECTION 150X150X6Thk-2255Lg	2	IS:4923	60		-do-
9.3	-do-	1	SQ. HOLLOW SECTION 150X150X6Thk- 1315Lg	3	IS:4923	69		-do-
9.4	-do-	1	SQ. HOLLOW SECTION 150X150X6Thk- 950Lg	4	IS:4923	25		-do-
9.5	-do-	1	SQ. HOLLOW SECTION 150X150X6Thk- 1925Lg	5	IS:4923	57		-do-
9.6	-do-	1	CHQ.PLATE 4200X3000X8THK	6	Mild Steel E 250-BR; IS:2062	791		-do-
9.7	-do-	3	SQ. HOLLOW SECTION 100X100X6Thk- 2408Lg	7	IS:4923	123		-do-
9.8	-do-	3	SQ. HOLLOW SECTION 100X100X6Thk- 797Lg	8	IS:4923	41		-do-
9.9	-do-	3	SQ. HOLLOW SECTION 100X100X6Thk- 900Lg	9	IS:4923	40		-do-
9.10	-do-	3	SQ. HOLLOW SECTION	10	IS:4923	61		-do-

			100X100X6Thk- 120Lg					
9.11	-do-	4	CHQ.PLATE 2000X2000X8Thk	11	Mild Steel E 250-BR; IS:2062	1005		-do-
9.12	-do-	1	SQ. HOLLOW SECTION 100X100X6Thk- 2408Lg	12	IS:4923	41		-do-
9.13	-do-	2	SQ. HOLLOW SECTION 100X100X6Thk- 1204Lg	13	IS:4923	41		-do-
10.0	**Details of UT Staircase for MLS**						1429	**10-STR-12-1-23/A1 Sheet 12 of 12**
10.1	-do-	1	PLATE 200X150X25Thk	1	Mild Steel E 250-BR; IS:2062	6		-do-
10.2	-do-	1	ISMC 100- 7780Lg	2	IS: 808	72		-do-
10.3	-do-	51	ISA 50X50X6Thk- 450Lg	3	IS: 808	103		-do-
10.4	-do-	7	ROD Ø10X1656Lg	4	Mild Steel E 250-BR; IS:2062	7		-do-
10.5	-do-	5	PLATE 6075X50X5Thk	5	Mild Steel E 250-BR; IS:2062	60		-do-
10.6	-do-	2	ISMC 100- 8000Lg	6	IS: 808	147		-do-
10.7	-do-	52	ISA 50X50X6Thk- 450Lg	7	IS: 808	105		-do-
10.8	-do-	7	ROD Ø10X1656Lg	8	Mild Steel E 250-BR; IS:2062	7		-do-
10.9	-do-	5	PLATE 6000X50X5Thk	9	Mild Steel E 250-BR; IS:2062	60		-do-
10.10	-do-	2	ISMC 100- 5900Lg	10	IS : 808	109		-do-
10.11	-do-	78	ISA 50X50X6 Thk- 450Lg	11	IS : 808	158		-do-
10.12	-do-	10	ROD Ø10X1656Lg	12	Mild Steel E 250-BR; IS:2062	10		-do-

10.13	-do-	10	PLATE 4050X50X5Thk	13	Mild Steel E 250-BR; IS:2062	119		-do-
10.14	do-	4	PLATE 550X350X25Thk	14	Mild Steel E 250-BR; IS:2062	151		-do-
10.15	do-	4	PLATE 550X350X20Thk	15	Mild Steel E 250-BR; IS:2062	121		-do-
10.16	do-	8	PLATE 400X200X20Thk	16	Mild Steel E 250-BR; IS:2062	100		-do-
10.17	do-	8	PLATE 200X160X20Thk	17	Mild Steel E 250-BR; IS:2062	40		-do-
10.18	do-	40	PLATE 200X75X20Thk	18	Mild Steel E 250-BR; IS:2062	94		-do-
11.0	Ground anchors	12					12384	
11.1	Base & top plate	2	32thk plate 820x820x32thk-2Nos		IS 2062 E250 Gr:B	338		
11.2	Stiffener	32	16thk plate 100x110x16thk-32nos		IS 2062 E250 Gr:B	49		
11.3	Side plates	1	80thk 440x336x80thk-1 no 600x336x80thk-1 no		IS 2062 E250 Gr:B	439		
11.4	Bearing plate	1	40thk plate 820x820x40thk-1no		IS 2062 E250 Gr:B	211		
12.5	Interface ring for MLS	1			IS 2062 E250 Gr:B		804	
12.1	Top annular ring		OD3030x ID 2850 25thk-1no		IS 2062 E250 Gr:B	163		
12.2	Bottom annular ring		OD3200xID2805x30thk-1no		IS 2062 E250 Gr:B	439		
12.3	Shell		OD2920xID2870x95Height-1no		IS 2062 E250 Gr:B	170		
12.4	Stiffener		120X95X10thk-36nos		IS 2062 E250 Gr:B	32		

CLASSIFICATION OF FABRICATION WORKS

Sl No.	DESCRIPTION
1	**Fabricated Structural items without machining for MLS conforming to IS:2062 & IS:808 (Grade E250)** (The items are base structure outer, top, bottom and deck., vertical and horizontal stiffening plates,)
2	**Fabricated structural items with normal machining for MLS conforming to IS:2062 & IS:808 (Grade E250)** (The items are anchor leg, anchor leg base plate, ground anchor and CAS cylindrical shell, interface ring)
3	**Fabricated extruded structural steel components for MLS conforming to IS:4923, IS:2062 & IS:808 (Grade E250)** (The complete UT structure including the extruded sections and plates as per sheet no. 10/14, 11/14 and 12/14)

DRAWINGS

1.0 GENERAL

1.1) This section provides details of the PRELIMINARY OVERALL DRAWINGS

1.2) The detailed fabrication will be provided along with PO and also during the execution of fabrication works.

2.0 LIST OF APPROVED PRELIMINARY DRAWINGS

2.1 TCE 10977A-ME-857-GA-0010R0

SEAL OF THE COMPANY

SIGNATURE :

NAME :

DESIGNATION :

COMPANY :

DATE :

SCHEDULE OF PRICES & GENERAL PARTICULARS

1. Bidders shall not alter the contents of this schedule of prices. If the bidder wants any additions / alterations, these shall be brought out separately in the format as given in this schedule of prices.

2. MLS to be supplied and erected shall be in accordance with section A, B, C, D, and E1 AND E2 of this specification.
3. The quoted price shall be price in Indian Rupees for procurement, revision of drawings, manufacture, supply, transportation, loading, unloading, packing & forwarding, inspection, erection, testing and commissioning of Mobile Launch Structure for SLC Project at vendor and purchaser site inclusive of all taxes and duties as applicable indicated in the price bid.
4. Final payments will be based on weights calculated from fabrication drawings issued by the Department.
5. Total price towards Supply portion, Erection and commissioning shall be indicated separately in the price bid and shall be firm and fixed. Same unit rates are also applicable for the quantity variation of ± 10% also.
6. SDSC SHAR reserves right to place order in full or part of the scope.

SCHEDULE OF PRICE

NOTE:

1. Cost for packing, forwarding and transportation shall be loaded to the unit rate for material supply and fabrication. Not to be quoted extra.
2. Fasteners shall be considered as machined components.

Sr. no.	Item	Unit	Qty.	Unit Cost (in Rs)	Total Cost	GST (%)	GST (In Rs.)	Total Cost (in Rs.)
1	Procurement, supply of material, manufacture, control assembly, testing and inspection at contractor's works, packing, forwarding, transportation, delivery, handling & storage at purchaser site with **fabricated structural steel / Mild steel** conforming to IS:2062 & IS:808 as per specifications enclosed with tender	t	200					
2	Procurement, supply of material, manufacture, control assembly, testing and inspection at contractor's works, packing, forwarding, transportation, delivery at site with handling & storage at purchaser site with **fabricated structural steel / Mild steel** conforming to IS:2062 & IS:808 **with normal machining** as per specifications enclosed with tender	t	60					
3	Procurement, supply of material, manufacture, control assembly, testing and inspection at contractor's works, packing, forwarding, transportation, delivery, handling & storage at purchaser site with **rolled steel sections** conforming to IS:4923 & IS:808 as per specifications enclosed with tender	t	50					
4	Erection, testing and commissioning of Mobile Launch Structure including storage / handling at site, erection, testing, commissioning and carrying out performance test as per specification enclosed with tender.	LS						

5	Third Party Inspection services for the fabrication and installation of MLS as per the Quality Assurance Procedure	LS						

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

1. PRE-QUALIFICATION CRITERIA

Bidders shall meet the following pre-qualification criteria. Offer of the bidders which are not meeting the following criteria will not be considered for evaluation.

A. Technical Qualification Requirements

The bidder shall meet the following technical qualifying requirements and shall submit relevant certificates to establish his credentials.

1. Bidder shall be an organization with long experience (more than Five years) in having executed contracts for manufacture, supply, erection, testing and commissioning of heavy structural works using structural built-up sections.

2. The firm shall have successfully completed Manufacture, Installation, testing and commissioning of heavy structural works of the order during last 5 years ending with 31.03.2023.

   One Heavy structural work of 300t
   or
   Two heavy structural works of 200 t each

Bidders have to provide relevant certificates along with the Techno-Commercial Bid.

3. The firm shall have facilities for fabrication and handling big structural items of at least 12m long and 10m wide for fitment, alignment, welding, etc. Bidder shall submit proof of having fabricated 6m x 9m structure of any height in the shop floor in preceding 3 years.

4. The firm should have successfully completed manufacture and establishment of heavy structures to the satisfaction of any of the reputed third party inspection agencies like M/s. MECON, M/s. M N Dastur, M/s. Lloyds, M/s. TCE, etc.

B. Financial Qualification Requirements

1. The Bidder's annual financial turnover shall be not less than ₹ 1000 Lakhs per year during last three Financial years ending with 31.03.2022

2. During Last 5 Years ending 31.03.2023, the bidders should have successfully completed either of the following:

   One similar completed work of heavy fabrication work not less than ₹ 750 lakhs

or

Two similar completed works of heavy fabrication work with each not less than ₹ 500 lakhs

or

Three similar completed works of heavy fabrication work with each not less than ₹ 350 lakhs

3. Latest Solvency certificate from a scheduled bank for ₹ 150 lakhs or above.

4. The Bidder should not have been blacklisted by any State Government, Central Government or any other Public Sector undertaking or a Corporation as on the date of Tender opening. **An undertaking to this effect shall be submitted by the service provider on its letter head.**

5. **The Bidder shall submit an undertaking that he/it has no insolvency case or petition or any criminal cases pending at the time of bid submission.**

6. Bidder shall not have the history of breach of tender conditions of the contract, for which contract is pre-closed by forfeiting the Bank Guarantee or termination of contract by the competent authority for not fulfilling the terms and conditions of the contract by the bidder, during past 10 preceding years. The bidder(s) shall give an undertaking to this effect on their letter head signed by their authorized signatory.

C. Documents to be submitted along with the bid submission

1. Firm establishment certificate and nature of work.
2. Details of work similar type completed during the last five years ending with 31.03.2023. (for SI. Nos.2& 3 of A)
3. Satisfactory work completion certificates from the clients, with the work order copies (for SI. Nos.2& 3 of A)
4. Parties who have obtained Purchase Orders in the past from ISRO shall inform the current status of the work (if the work is in progress) or produce completion certificate from concerned officials of ISRO mentioning date of P.O, title of work, due date for completion and actual date of completion.
5. The Bidders should have PAN, GST Registration No.
6. The Bidders shall submit Profit & Loss Accounts, Balance Sheets duly Certified by the auditor and IT returns for the last three financial years

with acknowledgement from IT Department up to last 3 years. Necessary documents shall be submitted.

7. IT/ TDS certificate shall be submitted for last three years.
8. Structure and Organization chart.
9. List if personnel with qualification & experience in the firm in the areas of design, production, quality, safety, administration etc.,
10. List of Machinery & Equipment's to be used for the work

D. Bid Selection Procedure and Process of Pre –Qualification

1. Short listing based on documents submitted, satisfying the all eligibility criteria given above by the firm or individual along with their Bid / application. (Non – submission of any document as given in above list within stipulated time leads to rejection of Bid).
2. Subsequently Bidder's competency, their technical achievements and financial status will be evaluated suitable for this project. Feedbacks from Bidder's clients will be verified.
3. Visit to sites by technical team (ISRO or Third party) where Bidder has established above mentioned works.
4. If required, visit will be made to their factory/ firm by technical team (ISRO or third party) for accessing the capability of manufacturer.
5. Scrutiny of all technical specification and supply conditions mentioned in techno-commercial bid.

SCHEDULE OF GENERAL PARTICULARS / VENDOR EVALUATION FORMAT

S.n	Name of the Bidder / Manufacturer	:	
1	Address of the Bidder / Manufacturer	:	
2	Type of Company Proprietary/Pvt.Ltd/Public Ltd/Joint Venture)		
3	Registration number		
4	Year of inception of the company		
5	Registered address		
6	Name & address of the office of the Chief Executive of the company		
7	Name & Designation of the officer of the Bidder to whom all correspondence shall be made for expeditious technical/ commercial co-ordination.		
8	Telephone number Fax number E-mail address		
9	Locations of the Branches of Company (if any)		
10	Annual turn-over of the company for the last three years		
11	IT returns for the last 3 years		
12	Major customers (Enclose copies of the Purchase Orders)		
13	Any customers feedback on the services which is in writing (Pl. enclose copies)		
14	Quality certification of the company		
15	PAN Card Copy		
16	The Profit & Loss Account details for the last 3 years which is duly audited and Submitted as part of the Annual Report		
17	Orders executed during last three years, > 200 T or > Rs. 5 crores, references are is to be mentioned. (Separate sheet can be attached).		
18	Shop floor area covered		
19	No. of employees (Supplier shall mention contract personnel separately) Engineers Supervisors Technicians Quality control engineers Administrative Staff.		
20	Handling facility available: Overhead / Gantry Crane details (Capacity, span lift). Mobile Cranes.		
21	Load testing facility Available: Maximum weight available. No. of weights Total test load available.		
22	Welding / fabrication workshop (Type / capacity / quantity of machines shall be provided) MMAW machines GMAW machines Gas cutting machines Plasma cutting machines Welding Fixtures		
23	No. of Welders (MMAW), Qualification details, No. of Welders (GMAW), Qualification details, No. of Welders (TIG), Qualification details,		

	Welders Qualified by:		
24	Details of welding Inspection Equipment & Welding inspector available with supplier (LPT, UT, MPT, Xray, etc)		
25	Forming facilities available (with brief specification of each machine Shearing Machine Cutting Machine Cutting Machine Bending Machine		
26	Machining Facilities available (with brief specification of each machine) Turning lathe (Conventional /CNC) Milling Machine (Conventional / CNC) Gear Cutting / Hobbing Machines Drilling Machines (conventional / CNC) Cylindrical Grinding Machine (Conventional / CNC) Any other machines		
27	Details of inspection facilities / Instruments available (Brief description & specifications shall be provided)		
28	If third party Inspection Services are taken for fabricating similar works give details.		
29	Design Software's available Drafting & modeling software packages FEM software Other softwares Design Engineers (with qualification & experience		
30	Bid validity period confirmation (Min. 4 months from date of bid opening)		
31	COMPLETION SCHEDULE		

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

CONFIRMATION OF ACHIEVING ACCURACY

The BIDDER shall furnish performance guarantees as listed below based on the data specified in section B:

1. Top launch vehicle mounting surface accuracy for CAS shall be maintained less than 30 arc seconds.
2. The maximum absolute value of deflection on top of CAS shall be less than 1.5 mm under the condition of full vehicle load of 120 t loaded on the MLS.
3. The verticality tolerance of each floor of UT shall be limited within 5mm and overall H/1200 or 35mm whichever is lesser according to IS 12843.
4. Mutual out-of-plane tolerance for bogie-support-plates at four corners shall be ±0.5mm

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

EXCEPTIONS AND DEVIATIONS

In line with Proposal Document, Bidder may stipulate Exceptions and deviations to the Proposed conditions if considered unavoidable.

Sl.no	Reference in Specification	Dept. Specification	Offered specification	Deviation

NOTE:

- Only deviations are to be written in the above format.
- Any deviations taken by the Bidder to the stipulations of the Proposal document shall be brought out strictly as per this format and enclosed along with the bid.
- Any deviations not brought out in this Proforma and written elsewhere in the Proposal document shall not be recognized and the same is treated as null and void.
- Any wilful attempt by the Bidders to camouflage the deviations by giving them in the covering letter or in any other documents that are enclosed may render the Bid itself non-responsive.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SCHEDULE OF TIME FOR MANUFACTURE, DESPATCH AND SHIPMENT TO MADHAVANKURICHI, THIRUCHENDUR TK., THOOTHUKUDI DIST TAMIL NADU

Equipment	Time for manufacture from date of P.O. excluding control assembly	Time for packing and ready for despatch from Works	Time for shipment to site	Deviation	Total time from date of P.O. to shipment to site.
MLS					

The Bidder hereby undertakes to meet the above time schedule from the date of LOI / PO

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SCHEDULE OF BIDDERS EXPERIENCE

The bidder shall furnish here under a list of STRUCTURAL works executed by him to whom a reference may be made by the PURCHASER in case the PURCHASER considers such a reference necessary.

SL. NO.	Name & address of Client / Name & address of project or plant (incl. tel.no., fax no., e-mail and name & designation of person who can be contacted.	Purchase Order / Contact no. and Date.	Brief details of equipment / system covered	Scope of services	Contract price (Rs)	Scheduled date of completion	Actual date of completion	Reasons for delay in completion, if applicable.	REMARKS

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

DATA TO BE FILLED ALONG WITH THE BID FOR SUPPLY & COMMISSIONING OF MLS

SR. NO.	DESCRIPTION	TENDERS OFFER
1.0	Confirm that the system shall be realised as per technical specification, approved manufacturing drawings, bill of material to meet the functional requirement.	Yes / No
2.0	Confirm that raw materials procured as per specification and to be erected tested & commissioned at site as per tender specifications.	Yes / No
3.0	Confirm that all the items are to be inspected by Bidder/TPIA / Departmental representative at Vendors shop before reaching to manufacturer's shop	Yes / No
4.0	Confirm that fabrication of all items shall be done as per IS: 800 & tolerance in fabrication shall be maintained as specified in relevant drawings.	Yes / No
5.0	Confirm that all sub-assemblies shall be control assembled at vendor site for alignment and tolerances inspection to meet the tender specifications	Yes / No
6.0	Confirm that fabricated modules shall be sand/grit blasted and applied with one coat of primer paints before control assembly and dispatch to SDSC SHAR as per tender specifications	Yes / No
7.0	Confirm that all the items shall be painted as per painting scheme.	Yes / No
8.0	Manufacturing schedule & Erection schedule is submitted along with offer.	Yes / No
9.0	Resources planning is submitted along with offer	Yes / No
10.0	Man power planning for erection shall be submitted along with offer	Yes / No
11.0	Confirm that survey of all civil interfaces will be carried out with own equipment & man power and based on survey reports, all sub-assemblies like anchoring and de-anchoring interfaces shall be erected & aligned. Also confirm that necessary packing plates will be supplied if required during erection.	Yes / No
12.0	Confirm that all the fasteners and testing tools required for erection of subassemblies will be supplied.	Yes / No
13.0	Confirm that testing and commissioning of the total system shall be carried out as per specification.	Yes / No
14.0	Confirm that QAP for fabricated items, machined items, Subassemblies and for entire MLS in assembled condition shall be submitted for approval.	Yes / No
15.0	Confirm that during execution of works, If required addition / deletion of the works will be carried out and such variation is limited to ± 10% of the total order quantity. The unit rates quoted shall be valid for the quantity variation of + 10%.	Yes / No

CHECK LIST

S.NO	DESCRIPTION	RESPONSE BY SUPPLIER
1.	All documents related to Prequalification criteria mention in Section F2 have been met and all related documents are enclosed in technical Bid	Yes / No
2.	The detailed scope of work and technical specifications are understood and price was quoted accordingly.	Yes / No
3.	Confirmation that the quoted prices are firm and fixed till the completion of scope of work.	Yes / No
4.	Validity of Offer is 4 months (minimum).	Yes / No
5.	Vendor Evaluation Format is attached	Yes / No
6.	GST at the prevailing rates for (If not mentioned it will be assumed that the price quoted are inclusive of taxes).	Yes / No
7.	Confirmation of Delivery Schedule with milestones	Yes / No
8.	Acceptance to the Department Payment Terms. Whether option A & B selected	Yes / No
9.	Are General terms and Conditions of Contract for Supply & Erection included in proposal acceptable?	Yes / No
10.	If not acceptable, are the deviations brought out in the "Schedule of Deviations"	Yes / No
11.	Are there any deviations from enquiry technical specifications (Section B)?	Yes / No
12.	If there are technical deviations, are these filled in "Schedule of Deviations from Tech. Specifications"?	Yes / No
13.	Warranty for the fully commissioned and accepted system is 12 months	Yes / No
14.	3% of the Order Value shall be submitted as Security Deposit for the performance of the contract along with acceptance of order letter, which is valid till acceptance of the system.	Yes / No
15.	3 % of the Order Value shall be submitted as Performance Bank Guarantee, which is valid till completion of the warranty period plus 3 months claim period.	Yes / No
16.	Liquidated Damages (Ref. Clause 26 of Section A.) are acceptable	Yes / No
17.	Last three years audited financial results are enclosed	Yes / No
18.	Registration certificate of the company is enclosed	Yes / No

19.	All the forms in Section F1 to F10 are filled and enclosed along with technical-unpriced bid.	Yes / No
20.	Technical documents / drawings are attached along with technical bid (Ref. Clause 3.2 of Section A)	Yes / No
21.	Section Priced Bid Format (F1) filled in e-procurement Price Bid form only.	Yes / No

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SCHEDULE OF SUB VENDORS

1.0 GENERAL

1.1) This section provides details of the approved vendors / approved makes for brought out items, which form a part of this enquiry package

1.2) Bidder shall clearly indicate the makes of all brought-out items and shall at no point of time during the execution deviate from those indicated in the offer document.

1.3) The contractor shall suggest and provide better make after taking prior approval of the department during execution of contract.

2. LIST OF PREFERRED SUB VENDORS /MAKES

2.1) PAINTS

A) M/S BERGER PAINTS

B) M/S ASIAN PAINTS

C) M/S GRAND POLYCOATS

D) M/S BOMBAY PAINTS

2.2) THIRD PARTY INSPECTION AGENCY

A) M/S LLOYDS INSPECTION AGENCY

B) M/S TCE

C) M/S MECON

D) M/S M.N.DASTUR & COMPANY (P) LTD

E) M/S DNV GL

F) M/S BUREAU VERITAS

2.3) WELDING SEQUENCE

A) M/S WELDING RESEARCH INSTITUTE, TRICHY

2.4) FASTENERS

A) M/S UNBRAKO

B) M/S TVS

2.5) STRUCTURAL STEEL

A) M/S SAIL

B) M/S TATA

C) M/S JINDAL

D) M/S ESSAR